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ABSTRACT

This report looks back over a decade and tracks changes in high school course-taking. It partially updates a 1989 report titled "What Americans Study" and includes some information on instructional emphasis in mathematics and on additional topics related to course taking. These topics include differences among gender, racial, and ethnic groups, and among vocational and academic programs and public and private schools. Most of the data come from studies supported by the National Center for Education Statistics, and some are from the National Assessment of Educational Progress. Over the decade there were steady improvements in the proportion of students taking a defined minimum academic program and a core curriculum. Students took more advanced subjects and more advanced courses. Much room remains for improvement. Less than half of the 1990 graduates took the defined minimum academic program, and less than one in five completed the core curriculum. Many students, especially those from minority groups, took remedial mathematics, and there were racial and ethnic differences in exposure to parts of the curriculum. Males were more likely to take calculus and advanced science courses than were females. Twenty-six figures and 21 tables in an appendix present information about these trends. (SLD)

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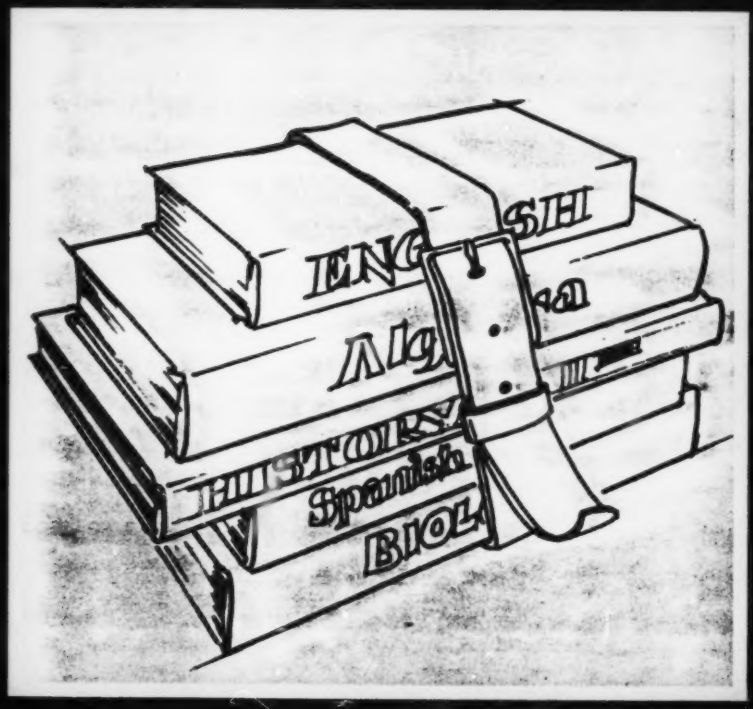
WHAT AMERICANS STUDY



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Preface

Prescribing more rigorous high school curriculum was central to the education reform movement of the 1980s, led by the report of the National Commission on Excellence in Education in 1983. Large changes occurred in course-taking patterns, and these changes were described in *What Americans Study*, issued by the ETS Policy Information Center in 1989. The current report, written by Richard J. Coley, revisits the pattern of course-taking and provides additional data. It describes trends in course-taking for all high school students and for college-bound seniors, describes trends in participation in the Advanced Placement Program® (AP™), and provides data on instructional emphases in mathematics instruction.

Paul E. Barton
Director
Policy Information Center

Acknowledgments

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Introduction

One of the most tangible outcomes of "the education reform decade" of the 1980s was the near-universal consensus that the high school curriculum should be strengthened. Reacting to perceptions of that curriculum as homogenized, diluted, and diffused, the National Commission on Excellence in Education recommended that students take a more rigorous program of study. States were quick to react. By the end of the decade 42 states had raised their high school graduation requirements.*

This report looks back over the decade and tracks change in high school course-taking, partially updating a 1989 Policy Information Report titled *What Americans Study*. The current report, however, expands coverage to include some information on instructional emphasis in mathematics and data on additional topics related to course-taking.

Particular attention is paid to looking at differences in course-taking between boys and girls, among students of different racial/ethnic backgrounds, between students enrolled in academic and vocational programs**, and between students attending public and nonpublic schools.

While these data were drawn using state-of-the-art methodologies to capture what students study in school, they do have some limitations. We cannot know, for example, whether instruction in algebra actually takes place in a course called "algebra," nor can we be confident that students in different schools, both enrolled in biology, are learning or exposed to similar content. Unfortunately, our ability to get beyond titles and brief descriptions of courses and into actual course content is limited.

The major portion of the data used in this report comes from transcript studies supported by the National Center for Education Statistics. The report also examines 1993 course-taking of college-bound high school seniors, along with trends in Advanced Placement Program (AP) participation. To begin to scratch the surface of course-taking and explore the *content* of coursework, some data from the 1992 National Assessment of Educational Progress in mathematics are also explored.

There is much good news in the data. Over the decade there were steady improvements in the proportion of students taking what is called a "minimum academic program" (four years of English and three years of social studies, science, and math) and a "core curriculum" (the minimum academic program plus two years of foreign language and a half year of computer science). Students took more academic subjects and more advanced courses.

There is also much room for improvement. Less than half of 1990 graduates took a "minimum academic program" and less than one in five completed a "core curriculum." In addition, many students, especially minority students, took remedial mathematics and some important racial/ethnic differences existed among students' exposure to particular aspects of the curriculum. And while males and females took the same number of Carnegie units in math and science overall, males were more likely to take calculus and to complete an advanced sequence of science courses. Especially sobering is the fact that students in vocational programs take so few mathematics and science courses.

Some aspects of course-taking (such as the percentage of students who take biology or algebra, or the average number of Carnegie units students complete in particular subjects) are at a sufficiently high level that we've reached the point where only marginal improvements can be expected in the future. On the other hand, when we look at how many of our students complete a rigorous academic program, the picture is grim. The scene for further improvements is shifting to setting standards for what is taught in these courses, and the early impact of these efforts to develop and implement content standards across curricu-

*Richard J. Coley and Margaret E. Goertz. *Educational Standards in the 50 States: 1990*. Princeton, NJ: Policy Information Center, Educational Testing Service, August 1990.

**According to the National Center for Education Statistics data used in this report, the breakdown among student programs in 1990 was as follows: Academic (69.3 percent), Vocational (7.7 percent), Both (9.8 percent), and Neither (13.2 percent). These categories are defined in Appendix 1.

lum areas remains to be measured. These efforts have the potential to transform the curriculum during the 1990s as much as or more than increased course-taking policies did during the "education reform decade."

••••

The report is organized as follows. The first section provides data on course-taking within each curriculum area, beginning with combinations of courses that policymakers have recommended for high school students. Subsequently, data are shown for particular subjects. Because of their increasing importance, particular mathematics and science courses are further delineated. The sections that follow describe the current course-taking of college-bound seniors, document the growth in Advanced Placement course-taking, and describe the instructional emphases that teachers give in mathematics instruction. Each subject or topic occupies two pages — text on the left and a chart on the right. The appendices include tables containing the data, along with standard errors.

Highlights and Summary

Some highlights of the data are presented below. Readers are encouraged to examine the text and charts that follow for additional analyses and more detailed information.

From High School Transcript Studies

• In 1990, 17 percent of American high school students completed the "core curriculum" recommended by the National Commission on Excellence in Education. This sequence is composed of four years of English; three years each of social studies, science, and mathematics; two years of a foreign language; and one-half year of computer science. In 1982, only 2 percent of high school graduates reached this level of course-taking.

• Forty percent of high school graduates in 1990 attained a curriculum termed "a minimum academic program." This curriculum is the same as that described as the "core curriculum" above, excluding the foreign language and computer science courses. In 1982, only 13 percent of high school students attained this level of education.

• Between 1982 and 1990, the level of course-taking:

- increased in English, history, mathematics, science, foreign language, and computer science

- increased in advanced sequences of mathematics and science

- decreased in remedial mathematics

- decreased in occupation–specific vocational education and in nonoccupation-specific vocational education

- was stable in social studies; visual and performing arts; and physical education, health, and sports

• Few gender differences were found in 1990.

- There was no difference between males and females in taking a "core curriculum" or a "minimum academic program." Likewise, males and females attained an equivalent number of Carnegie units in English, history, social studies, mathematics, science, computer science, occupation-specific vocational education, and non-occupation-specific vocational education.

- Males were more likely than females to take an advanced sequence of science courses and to take physical education, health, and sports. Males also were more likely to take calculus.

- Females took more coursework than males in foreign language and visual and performing arts.

• There were differences in course-taking among racial/ethnic groups of students in 1990.

- Asian/Pacific students were more likely than Black and Hispanic students to take a "core curriculum."

- Asian/Pacific students were more likely than White and Hispanic students to take a "minimum academic program."

- Hispanic and Asian/Pacific students took more English than White students.

- Black and Hispanic students were more likely than Asian/Pacific and White students to take remedial mathematics.

- Asian/Pacific students took more mathematics than other students.

They were also more likely to take advanced sequences of mathematics and science courses.

- Asian/Pacific and White students took more science courses than Hispanic students.

- Asian/Pacific students took more foreign language courses than all other groups of students; Black students took fewer foreign language courses than all other groups of students.

- Asian/Pacific students took fewer vocational education courses than all other groups of students.

- White students took more visual/performing arts courses than other students.

- Hispanic students took more physical education, health, and sports than White students.

• There were also differences among students enrolled in different programs in 1990.

- Students enrolled in academic programs were more likely than students in vocational or mixed programs to accumulate a "core curriculum" and a "minimum academic program." They also took more coursework in English, history, social studies, mathematics, science, foreign language, and computer science. Students in academic programs were much more likely to pursue advanced sequences of mathematics and science courses. The differences in math and science course-taking between students in academic programs and those enrolled in vocational programs were particularly striking.

- As would be expected, students in vocational programs took more vocational courses than students in academic programs.

• Public and nonpublic school graduates also exhibited differences in 1990.

- Students from nonpublic schools were more likely to complete a "core curriculum" and a "minimum academic program." They also took more courses in English, history, mathematics, science, and foreign language.

- Public school students, on average, took more vocational education subjects.

From College Board Data

• Among college-bound high school seniors who took the SAT in 1993:

- more than nine out of ten took biology, U.S. history, algebra, and geometry. A little more than half took trigonometry, a third took precalculus, and a fifth took calculus. Spanish was the most popular foreign language studied, with 60 percent of seniors taking this course. Word processing was the most popular computer course (62 percent); computer literacy was taken by 45 percent of college-bound seniors.

• Advanced Placement (AP) participation continues to rise.

- Over the decade, the number of AP examinations taken has increased about 270 percent.

- Students from all racial/ethnic backgrounds have shared in this growth.

From NAEP Data

• Eighth grade math teachers' instructional emphasis on facts and concepts, skills and procedures needed for problem solving, developing reasoning ability to solve problems, and communicating ideas in mathematics have generally improved between 1990 and 1992. There is still much room for improvement if curriculum reform of the type envisioned by the standards set by the National Council of Teachers of Mathematics (NCTM) is to be realized.

• Instructional emphasis differs by student ability grouping. Students in lower ability groups were more likely to receive instruction that heavily emphasized mathematics facts and concepts. They were less likely to receive instruction that emphasized reasoning to solve problems or communicating ideas in mathematics effectively.

Core Curriculum

In 1983, the National Commission on Excellence in Education, responding to the perceived crisis in American education, proclaimed that high school students should complete a program (here called a "core curriculum") that includes:

- four years of English
- three years of social studies
- three years of science
- three years of mathematics
- two years of a foreign language*
- one-half year of computer science**

In 1990, 17 percent of American high school students completed such a program, up from only 2 percent in 1982 and 12 percent in 1987. This progress applied to both males and females and to all racial/ethic groups (with the exception of Asian/Pacific students who held steady between 1987 and 1990 with nearly one-fourth completing this type of program). The percentage of students in both public and non-public schools completing a "core curriculum" also increased between 1982 and 1990.

Among the class of 1990:

- Asian/Pacific students were more likely than Black and Hispanic students to complete this program.
- Students in academic programs*** outpaced students in all other programs in taking a "core curriculum."
- Students attending nonpublic schools were more likely than other students to complete this combination of courses.

Note: All differences described in the text are statistically significant as determined by a t-test with 10 degrees of freedom.

*Two years of a foreign language was strongly recommended for students planning to attend college.

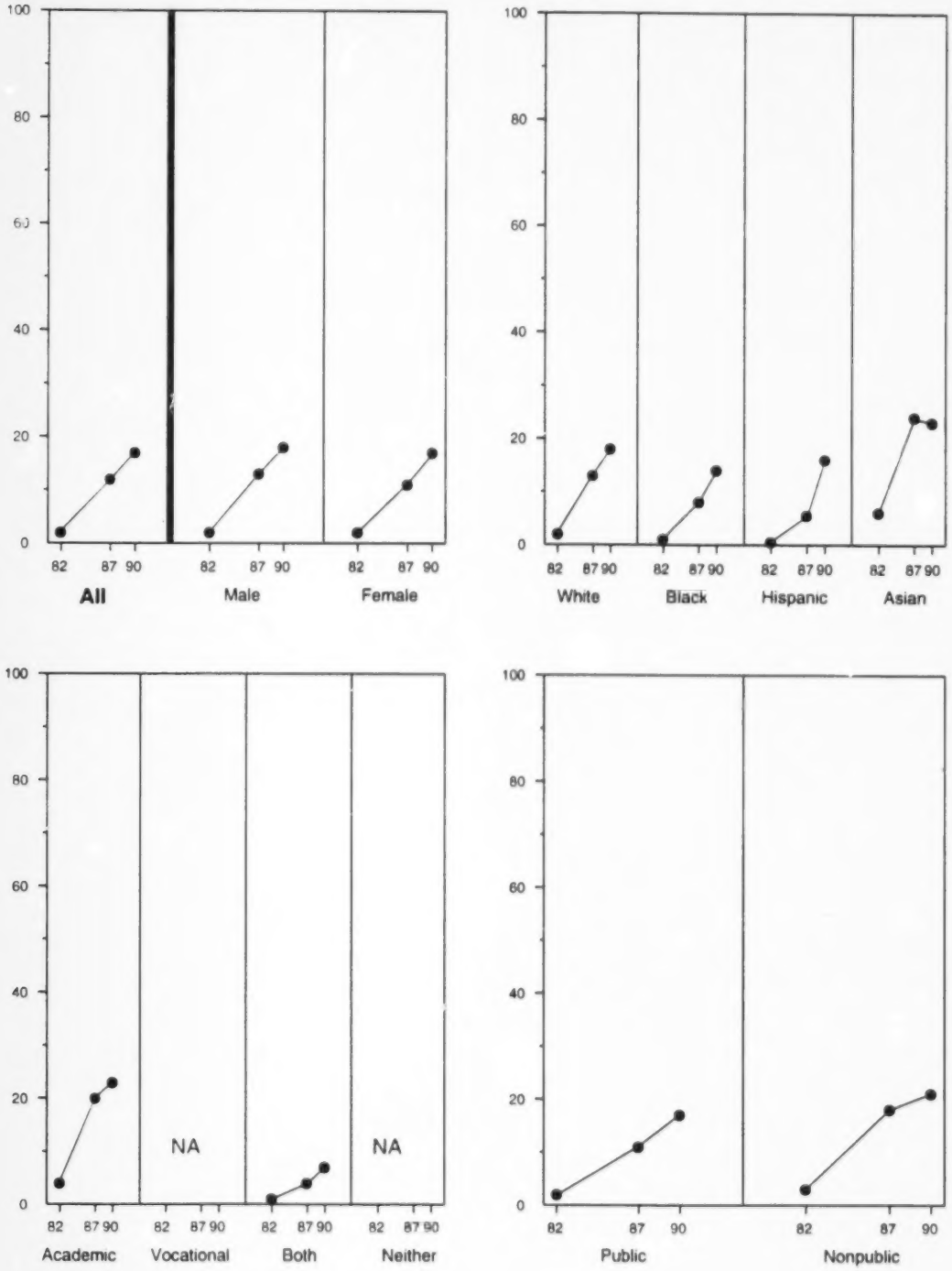
**_A Nation at Risk: The Imperative for Educational Reform_. National Commission on Excellence in Education, April 1983.

***See Appendix 1 for a description of the programs.

Source: Stanley Legum et al. _The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates_, National Center for Education Statistics, April 1993, Table 70-76, pp. A-185-190.

See Appendix Table 1 for data and standard errors.

Figure 1: Trends in the Percentage of Students Taking a "Core Curriculum" in High School



Minimum Academic Program

This program is defined by the National Commission on Excellence in Education as including the same requirements as the "core curriculum" described on the previous page, excluding the foreign language and computer science requirements.

In 1990, four out of ten American high school graduates completed four years of English, three years of social studies, and three years each of math and science, an increase of 27 percentage points over 1982. This increase applies to students of all racial/ethnic groups, males and females, students in academic and vocational programs, and students attending both public and nonpublic schools. With the exception of Asian/Pacific students, this growth continued between 1987 and 1990.

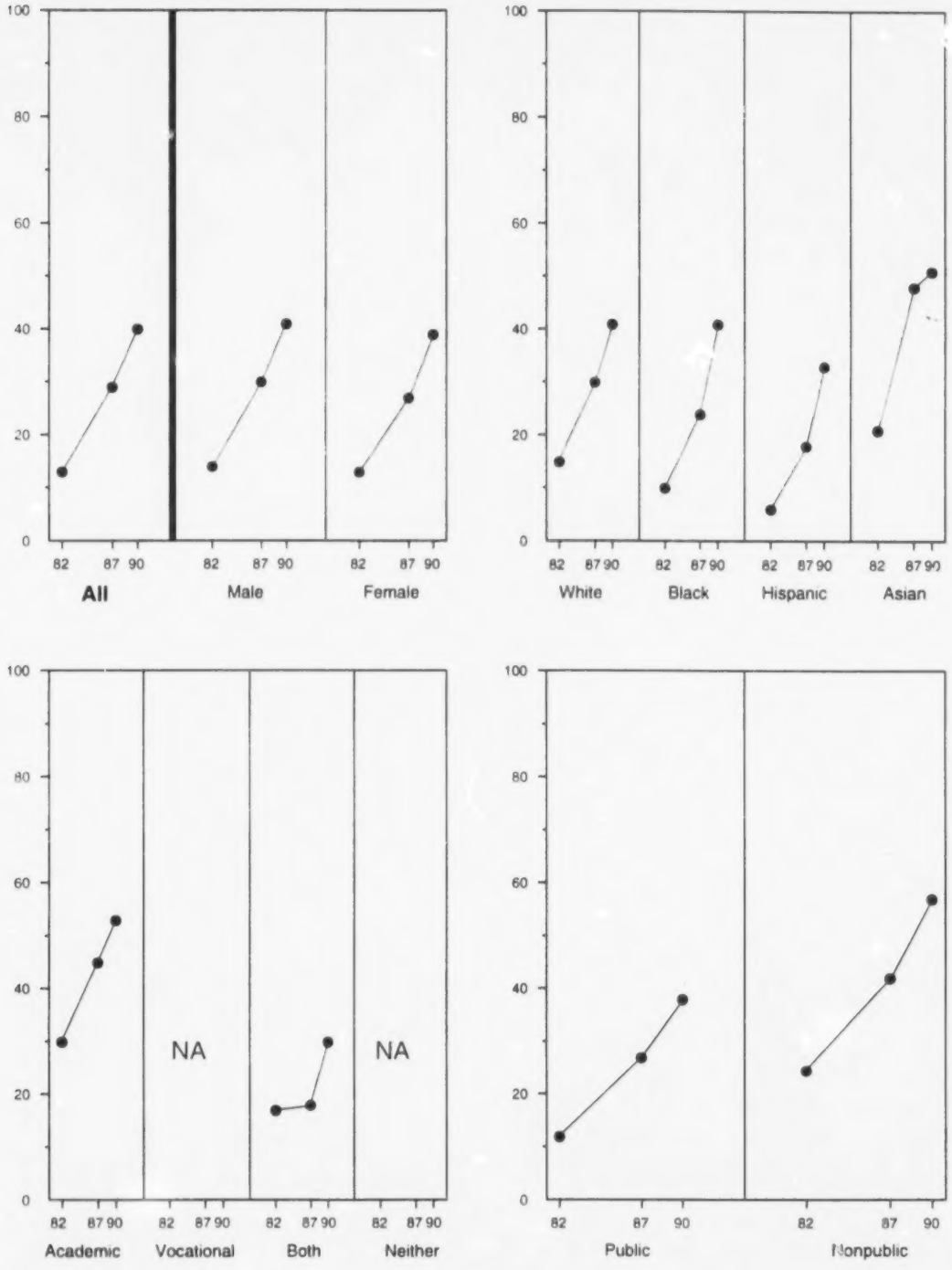
There were some differences among 1990 graduates, however.

- Asian/Pacific students outpaced White and Hispanic students.
- Students in academic programs topped students in other programs.
- More students in non-public schools took a "minimum academic program" than students in public schools.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Tables 70-76, pp. A-185-190.

See Appendix Table 2 for data and standard errors.

Figure 2: Trends in the Percentage of High School Students Taking a "Minimum Academic Program"



Mathematics

Graduates took slightly more than three Carnegie units of mathematics in 1990, an increase of about one-half of a unit from 1982.*

This gain was shared by males and females, students from all racial/ethnic groups, students in academic and vocational tracks, and students in both public and nonpublic schools. The only students who did not progress were those enrolled in programs described as both academic and vocational.

In 1990, a few differences were seen among students.

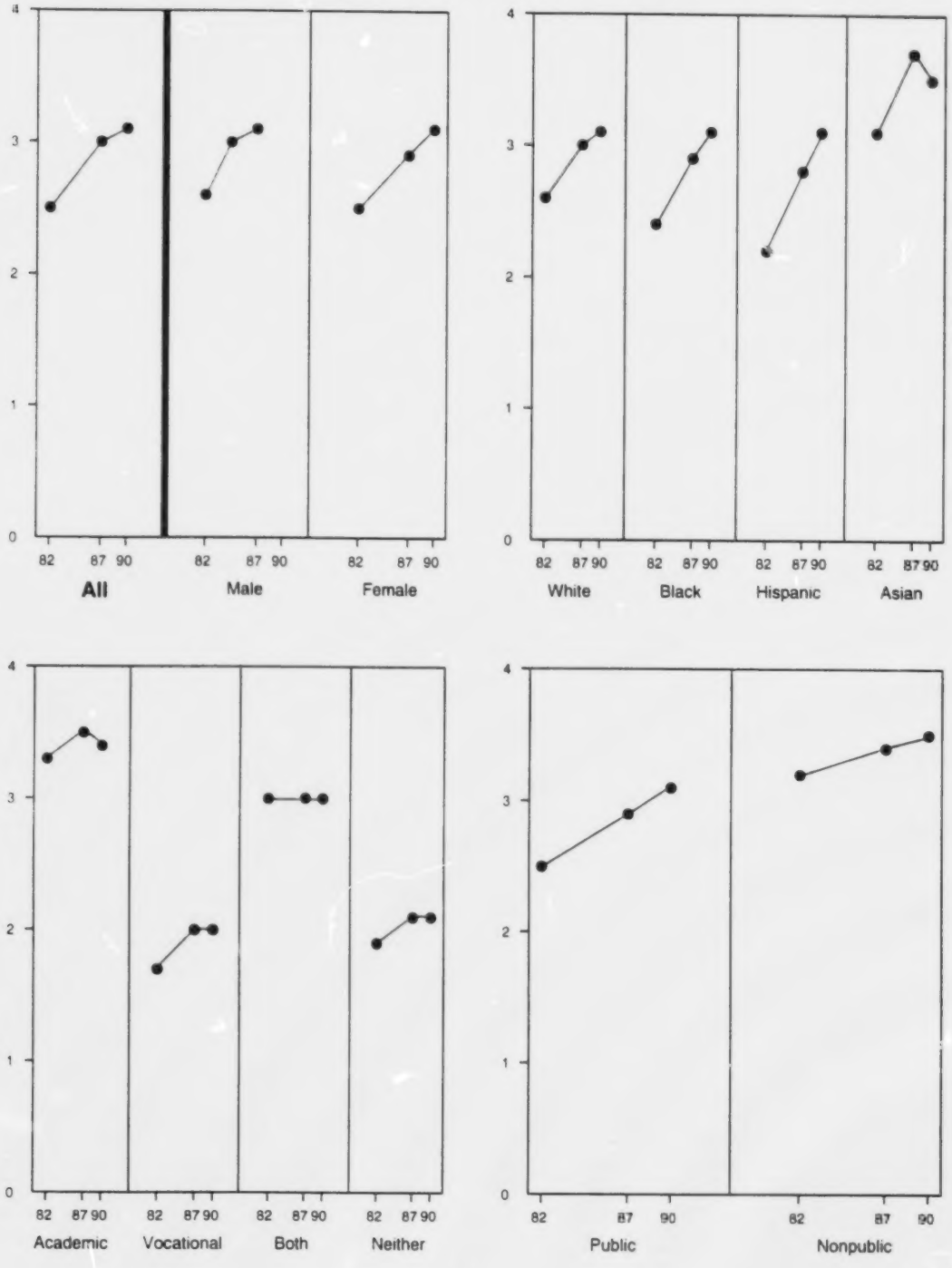
- Asian/Pacific students took more math (3.5 units) than White, Black, or Hispanic students (3.1 units).
- Students in academic programs took more math (3.4 units) than students in vocational programs (2 units) or in programs described as being neither academic nor vocational (2.1 units).
- Students in nonpublic schools took 3.5 units of mathematics, on average — significantly more than students attending public schools (3.1 units).

*A Carnegie unit is defined as a single class period (45 to 60 minutes in length) once per day for a complete academic year.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Table 13, p. A-83.

See Appendix Table 3 for data and standard errors.

Figure 3: Trends in the Average Number of Carnegie Units in Mathematics Taken by High School Students



Remedial Mathematics

Nearly one-quarter of the high school graduates in 1990 took a remedial mathematics course, a decrease from 33 percent in 1982. This decrease was exhibited by males and females, Black and White students, students in academic programs, and students who attended public schools. There was no significant change for Hispanic and Asian/Pacific students, for students in other than academic tracks, and for nonpublic school students.

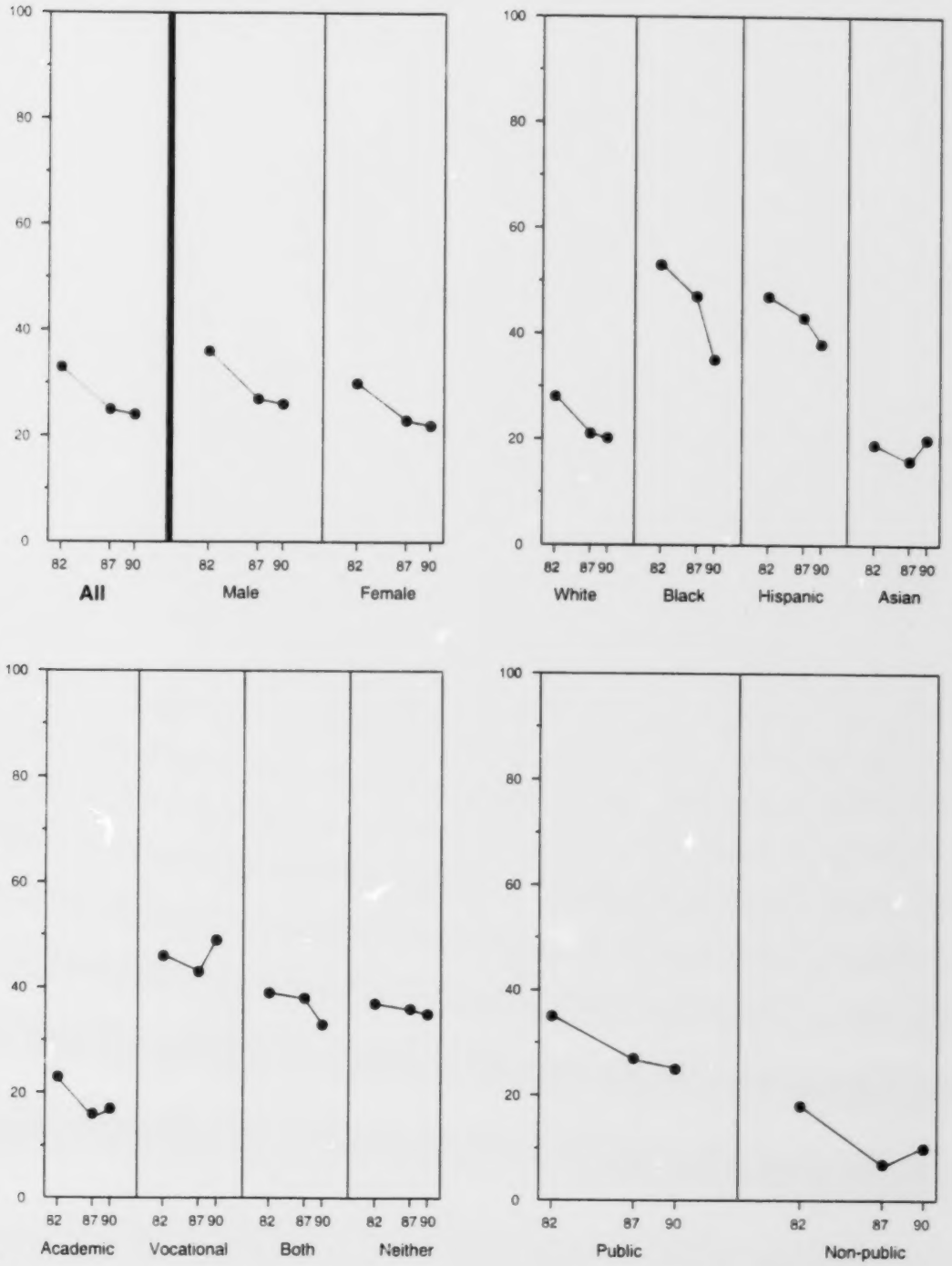
Among 1990 graduates:

- Black and Hispanic students were more likely than White and Asian/Pacific students to take remedial mathematics.
- Half of vocational students took remedial mathematics, compared to only 17 percent of students in academic programs.
- Students in public schools (25 percent) were more likely than students in nonpublic schools (10 percent) to take remedial mathematics.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Tables 35-40, pp. A-144-153.

See Appendix Table 4 for data and standard errors.

Figure 4: Trends in the Percentage of High School Students Taking Remedial Mathematics



Algebra I, II, and Geometry

A little more than one-third of high school graduates in 1990 completed a sequence of at least 2.5 Carnegie units that included algebra I, algebra II, and geometry. This represents an increase over 1982, when only one-fifth of high school students took these courses.

Between 1982 and 1990, there were increases across all demographic subgroups, but little change occurred between 1987 and 1990. This pattern applies to all racial/ethnic groups except Hispanics (who showed an increase between 1987 and 1990), to both males and females, to students enrolled in academic programs, and to both public and nonpublic school students. Students in other than academic programs, however, showed no increase in this mathematics course sequence between 1982 and 1990.

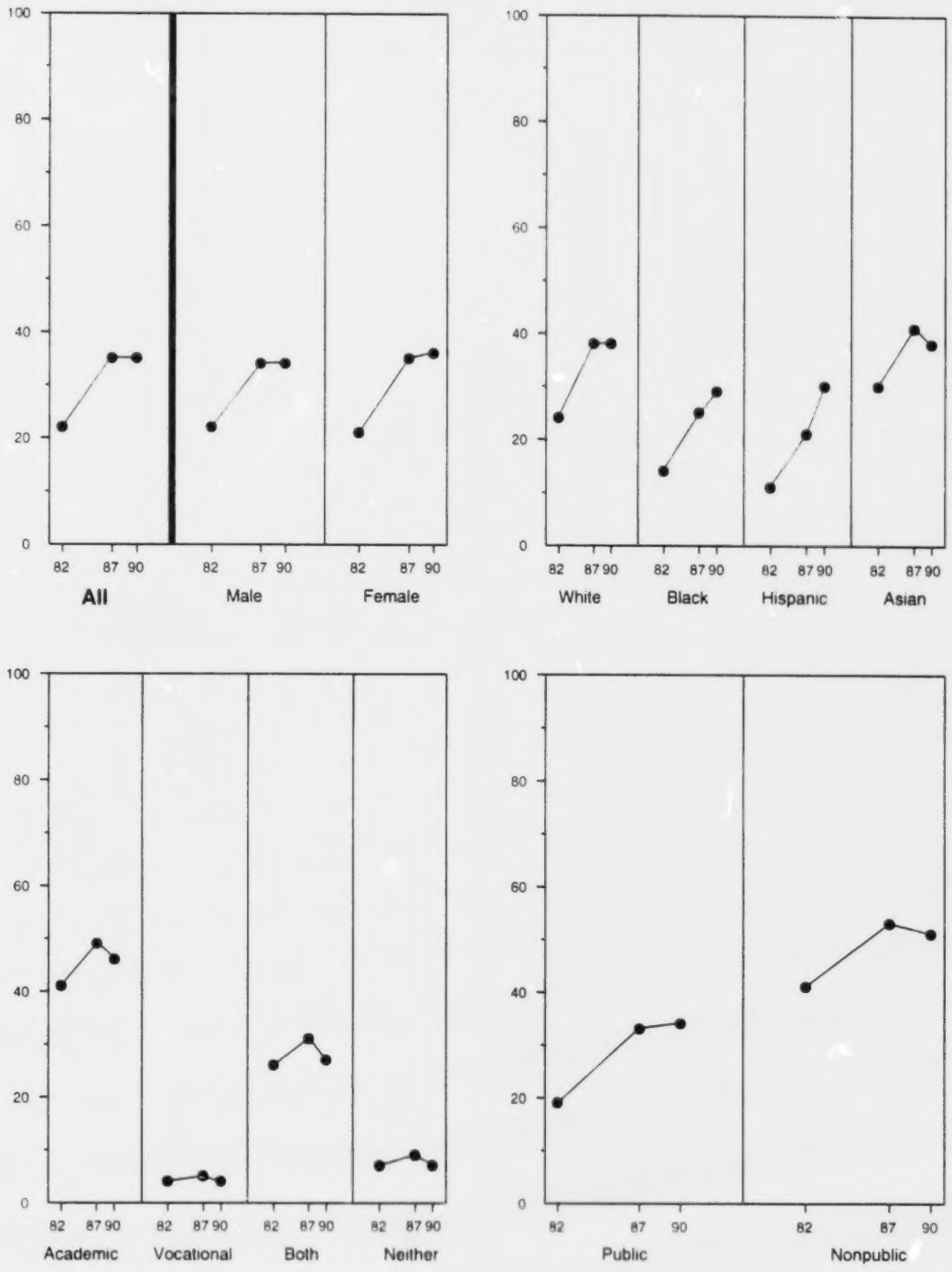
Among 1990 graduates:

- White students were more likely than Black students to take these courses, and Asian/Pacific students were more likely than Hispanic and Black students.
- The enrollment of students in academic programs outpaced enrollment of students in all other programs. Only 4 percent of students in vocational programs took these basic and important math courses.
- A larger proportion of nonpublic school students than public school students took these courses.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Tables 35-40, pp. A-144-153.

See Appendix Table 5 for data and standard errors.

Figure 5: Trends in the Percentage of High School Students Taking Algebra I, II, and Geometry



Algebra II, Geometry, Trigonometry, and Calculus

Only 2 percent of 1990 graduates attained this level of mathematics courses, representing a minimum of three Carnegie units in algebra II, geometry, trigonometry, and calculus. While modest, this represents an improvement over 1982 (1 percent). There was no improvement between 1987 and 1990.

This pattern of improvement between 1982 and 1990, with no change between 1987 and 1990, was seen for males and females, all racial/ethnic groups (except Asian/Pacific students who remained stable), and for public school students. There was no change for nonpublic school students or for students enrolled in academic programs.

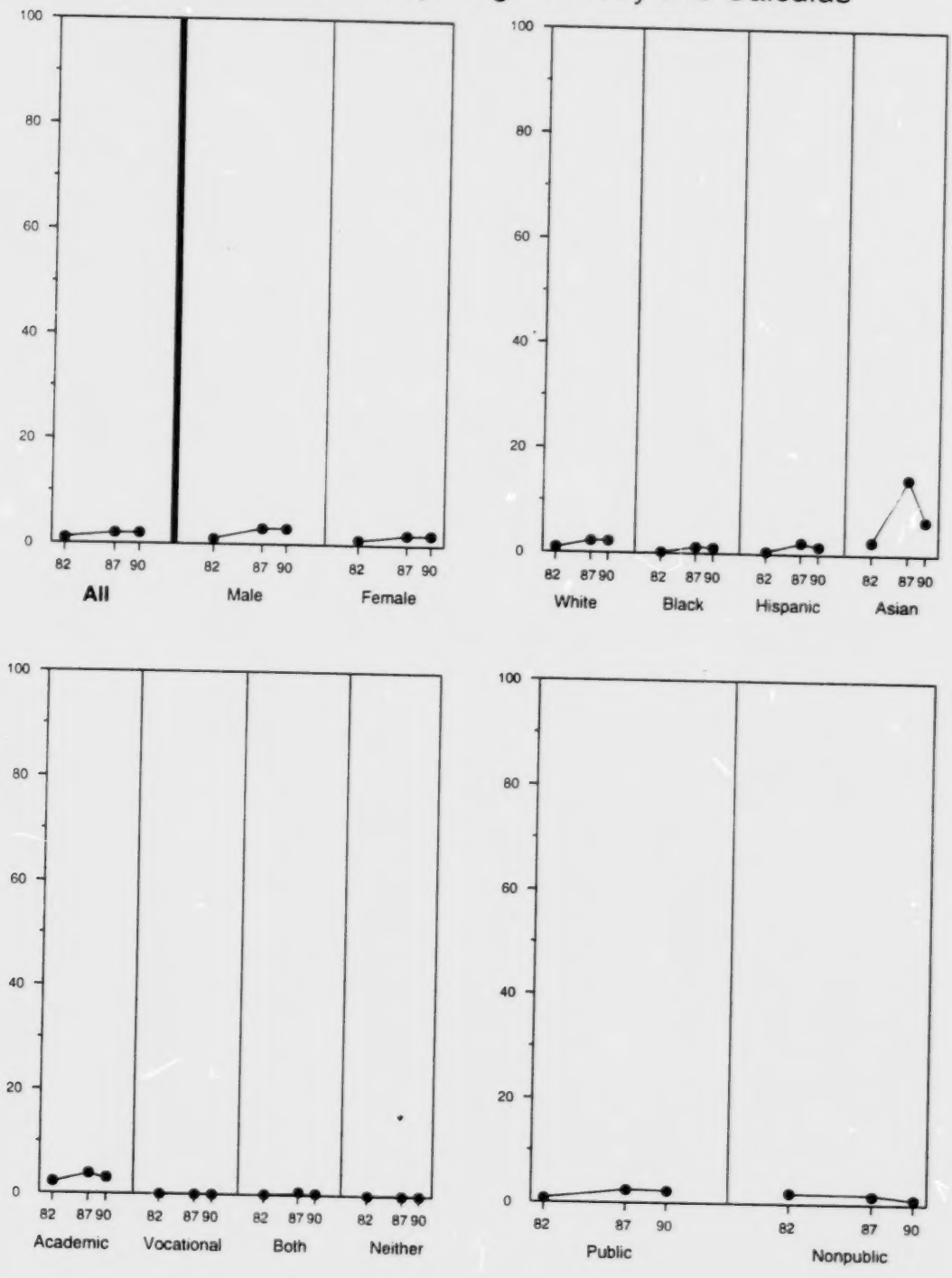
Among the class of 1990:

- White students were more likely than Black students, and Asian/Pacific students were more likely than Black or Hispanic students to have pursued this sequence of courses.
- Students in academic tracks and students attending public schools were more likely than their peers to have attained this level of mathematics course-taking.
- There was a small but statistically insignificant difference between males and females (2.5 percent and 1.8 percent, respectively). Males were more likely than females, however, to take calculus.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Tables 35-40, pp. A-144-153.

See Appendix Table 6 for data and standard errors.

Figure 6: Trends in the Percentage of High School Students Taking Algebra II, Geometry, Trigonometry and Calculus



Science

Students completed 2.8 units of science in 1990, up from 2.2 units in 1982 and 2.6 units in 1987. This gain was shared by both males and females; by White, Black, and Hispanic students (Asian/Pacific students went up between 1982 and 1987 and then held steady); and by students in academic programs and in programs described as neither vocational nor academic. Students in vocational programs took more science between 1982 and 1987 and then held steady. Students in both public and nonpublic schools shared in this growth.

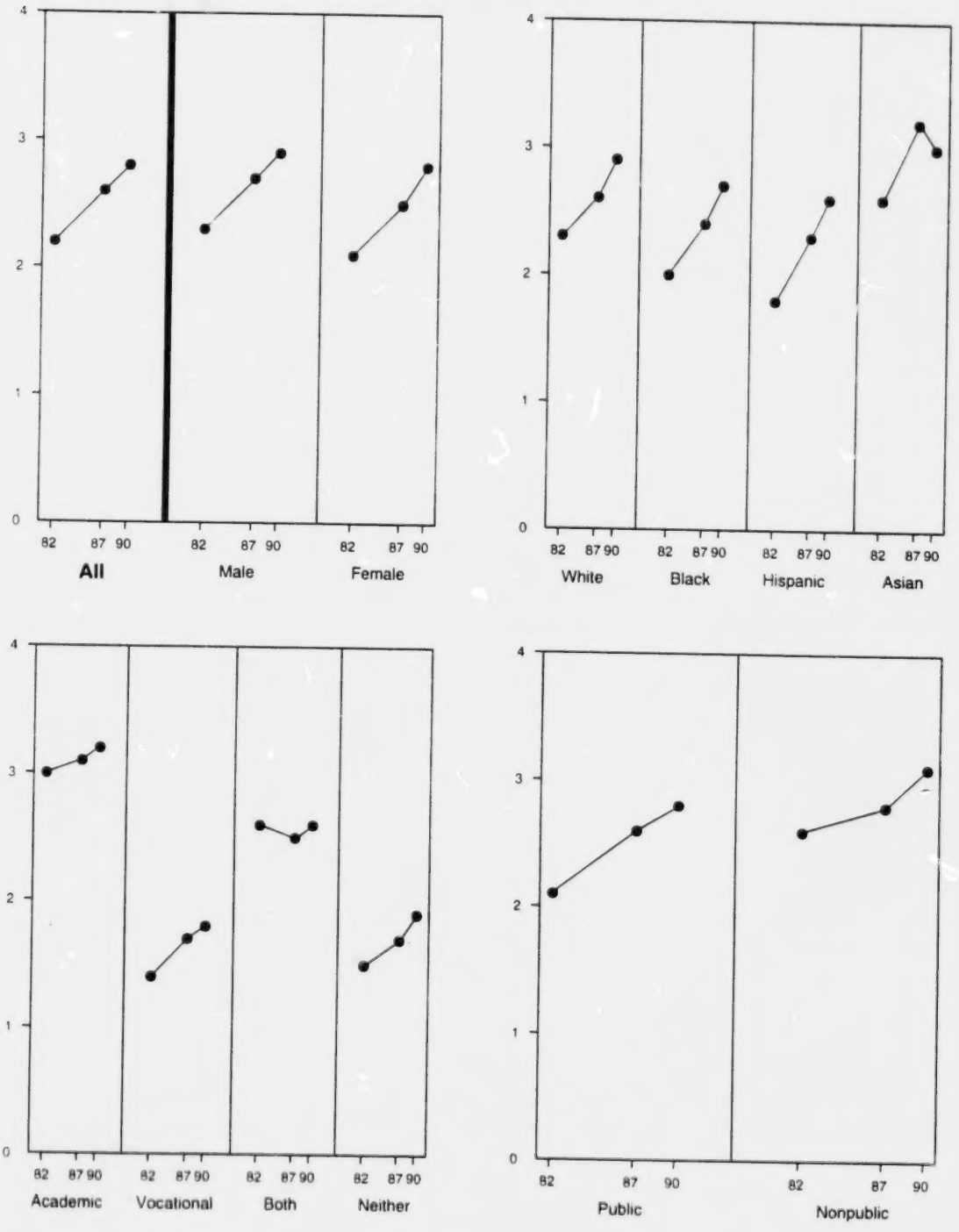
Among seniors in 1990, several differences were found.

- White students and Asian/Pacific students took more science than Hispanic students.
- Students in academic programs took the most science (3.2 units), and students in vocational programs took the least (1.8 units).
- Students in nonpublic schools took more science than their peers in public schools.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Table 13, pp. A-88-90.

See Appendix Table 7 for data and standard errors.

Figure 7: Trends in the Average Number of Carnegie Units in Science Taken by High School Students



Biology

Ninety-two percent of 1990 high school graduates took biology, up from 75 percent in 1982, with most of the change occurring between 1982 and 1987.

There was an increase between 1982 and 1990 for all subgroups — for both males and females, all racial/ethnic groups, students in all programs, and students attending public and nonpublic schools.

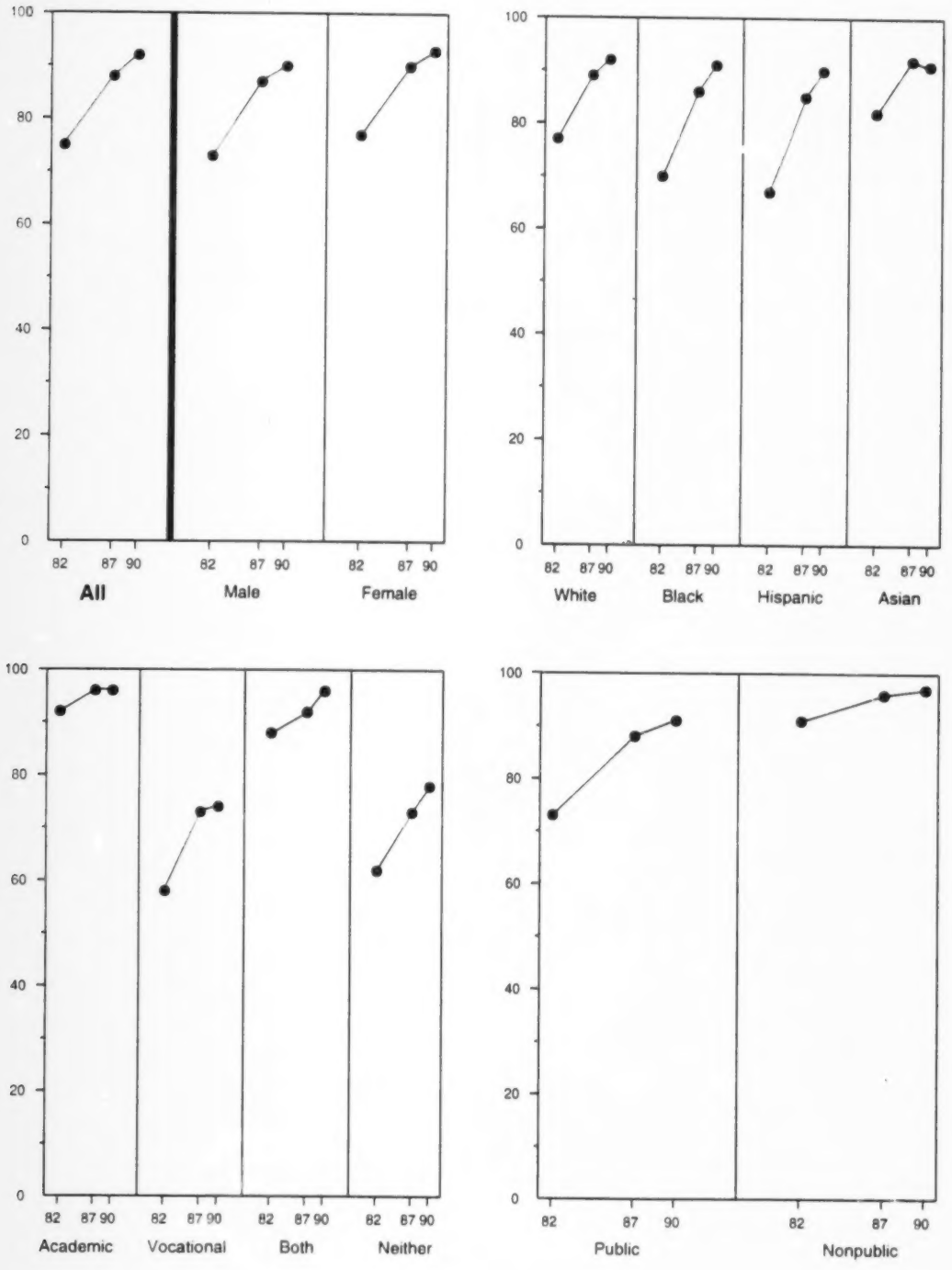
Within the class of 1990:

- There were no differences in taking biology among students of different racial/ethnic backgrounds or sex.
- Students in academic programs and students in programs described as being both vocational and academic were more likely to take biology than students in vocational programs or in programs considered neither academic nor vocational.
- Students who attended nonpublic schools were more likely to take biology than students attending public schools.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Tables 42-47, pp. A-157-162.

See Appendix Table 8 for data and standard errors.

Figure 8: Trends in the Percentage of High School Students Taking Biology



Biology and Chemistry

Forty-eight percent of 1990 high school graduates took biology and chemistry, up from 28 percent in 1982 and 43 percent in 1987. These increases were for males and females, students from all racial/ethnic groups, students in academic programs (there was no change for students in other than academic programs), and both public and nonpublic school students.

Among the class of 1990:

- Asian/Pacific students were more likely than other students to take biology and chemistry, and White students were more likely than Black and Hispanic students to take these two courses.

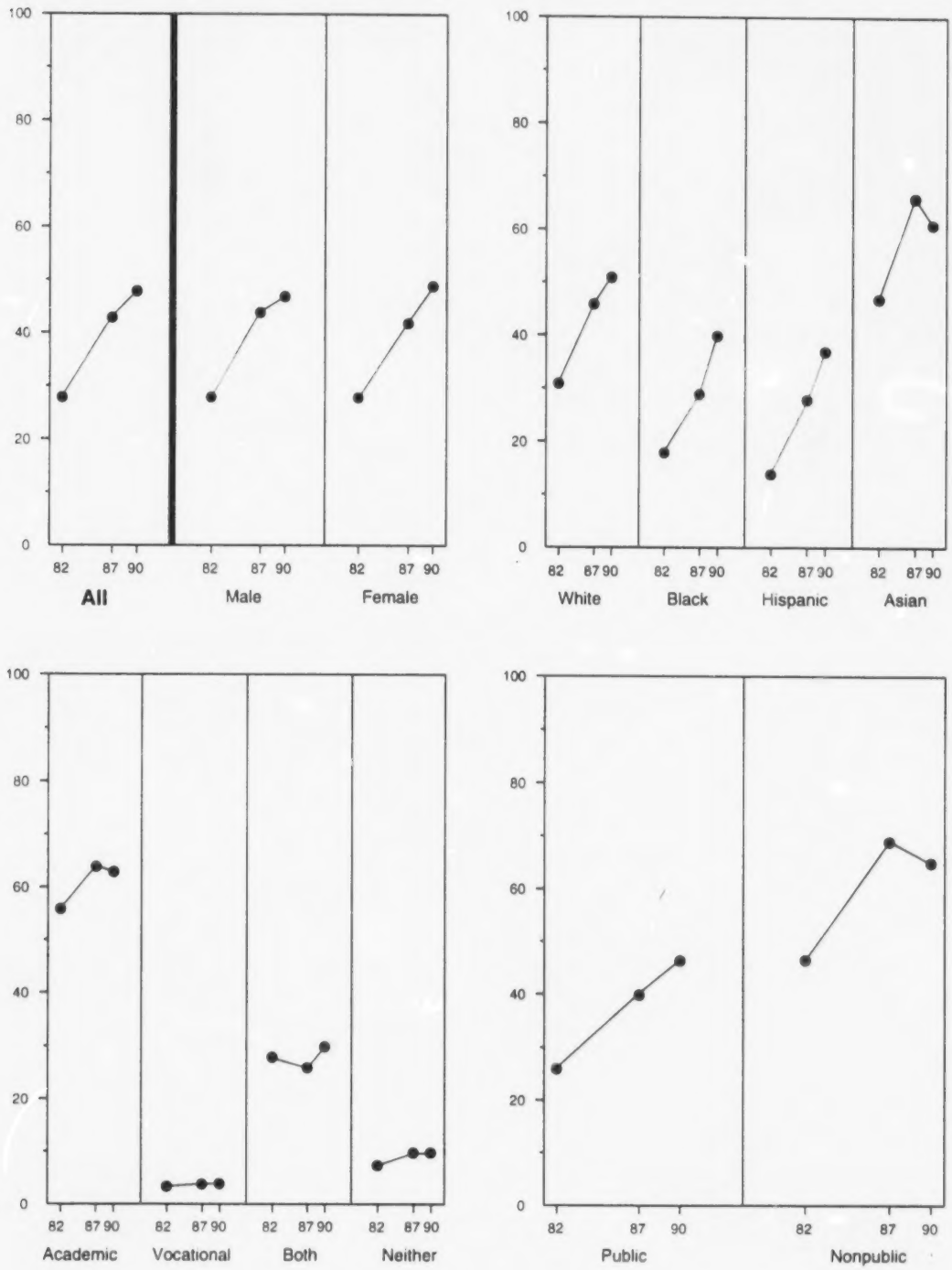
- Academic track students were more likely than students in other programs to take biology and chemistry. Only 4 percent of the students in vocational programs took these courses, compared to 63 percent of the students in academic programs.

- More students attending nonpublic schools (55 percent) took these courses than public school students (47 percent).

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Tables, 42-47, pp. A-157-162.

See Appendix Table 9 for data and standard errors.

Figure 9: Trends in the Percentage of High School Students Taking Biology and Chemistry



Biology, Chemistry, and Physics

Nearly one-fifth of high school graduates in 1990 completed at least three Carnegie units in biology, chemistry, and physics. This represents an increase of eight percentage points since 1982. This increase was shared by both males and females, by students of all racial/ethnic groups except Asian/Pacific, and by students in both public and nonpublic schools. There were no significant changes by type of programs.

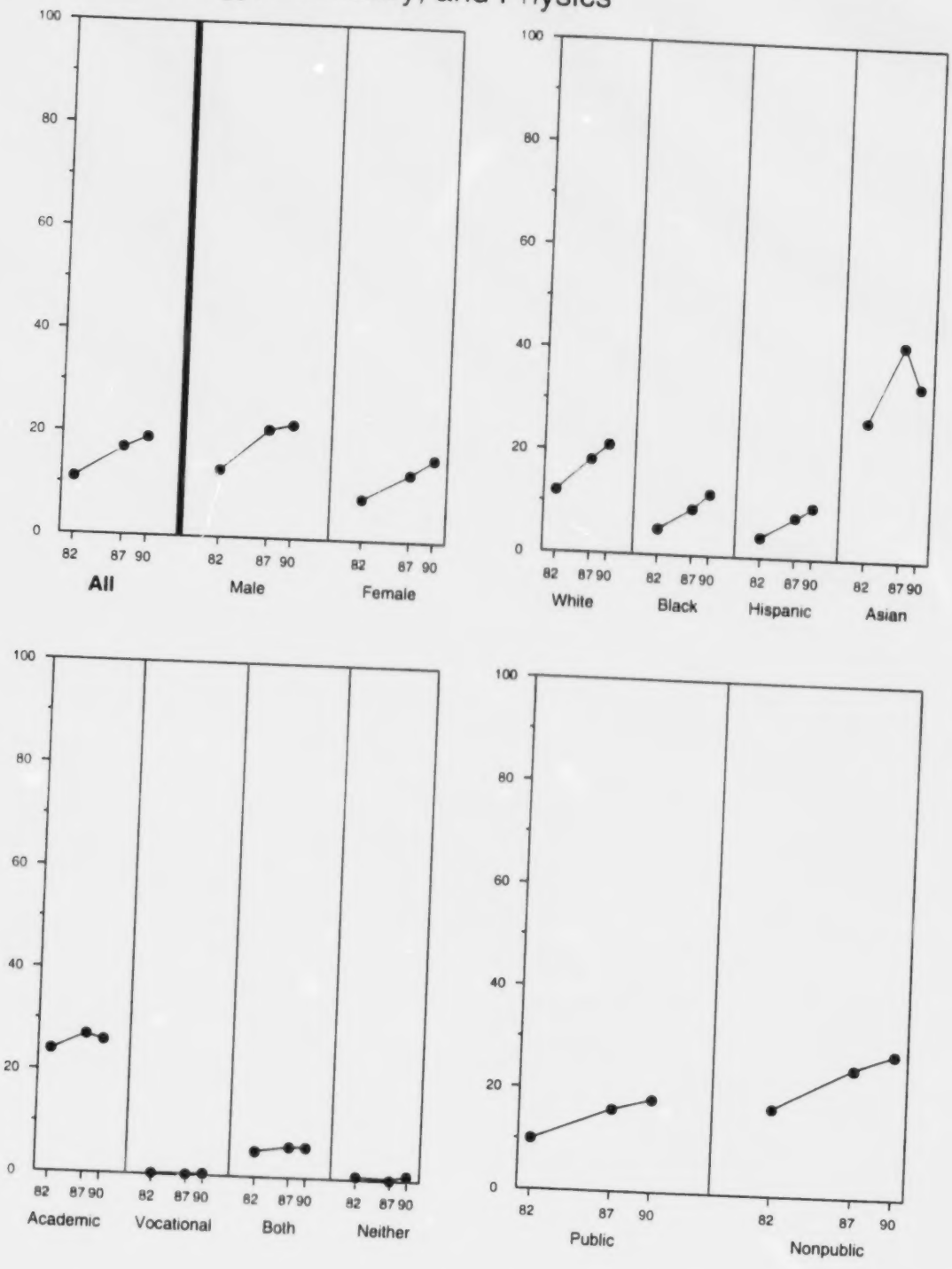
Among 1990 graduates:

- Males were more likely than females to complete this science course sequence.
- Asian/Pacific students were more likely than students from all other racial/ethnic groups to complete these courses. White students were more likely than Black and Hispanic students to take them.
- Students in academic programs enrolled in these courses more often than students in the other programs. In fact, less than 1 percent of students in vocational programs took this much science.
- A larger proportion of nonpublic school students than public school students completed this course sequence.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Tables 42-47, pp. A-157-162.

See Appendix Table 10 for data and standard errors.

Figure 10: Trends in the Percentage of High School Students Taking Biology, Chemistry, and Physics



English

In 1990, the average U.S. graduate had accumulated 4.1 Carnegie units of English, an increase from the 3.8 units in 1982. This increase in English courses applied to males and females, students from each racial/ethnic group, and for students attending both public and nonpublic schools. There was no significant change by student program.

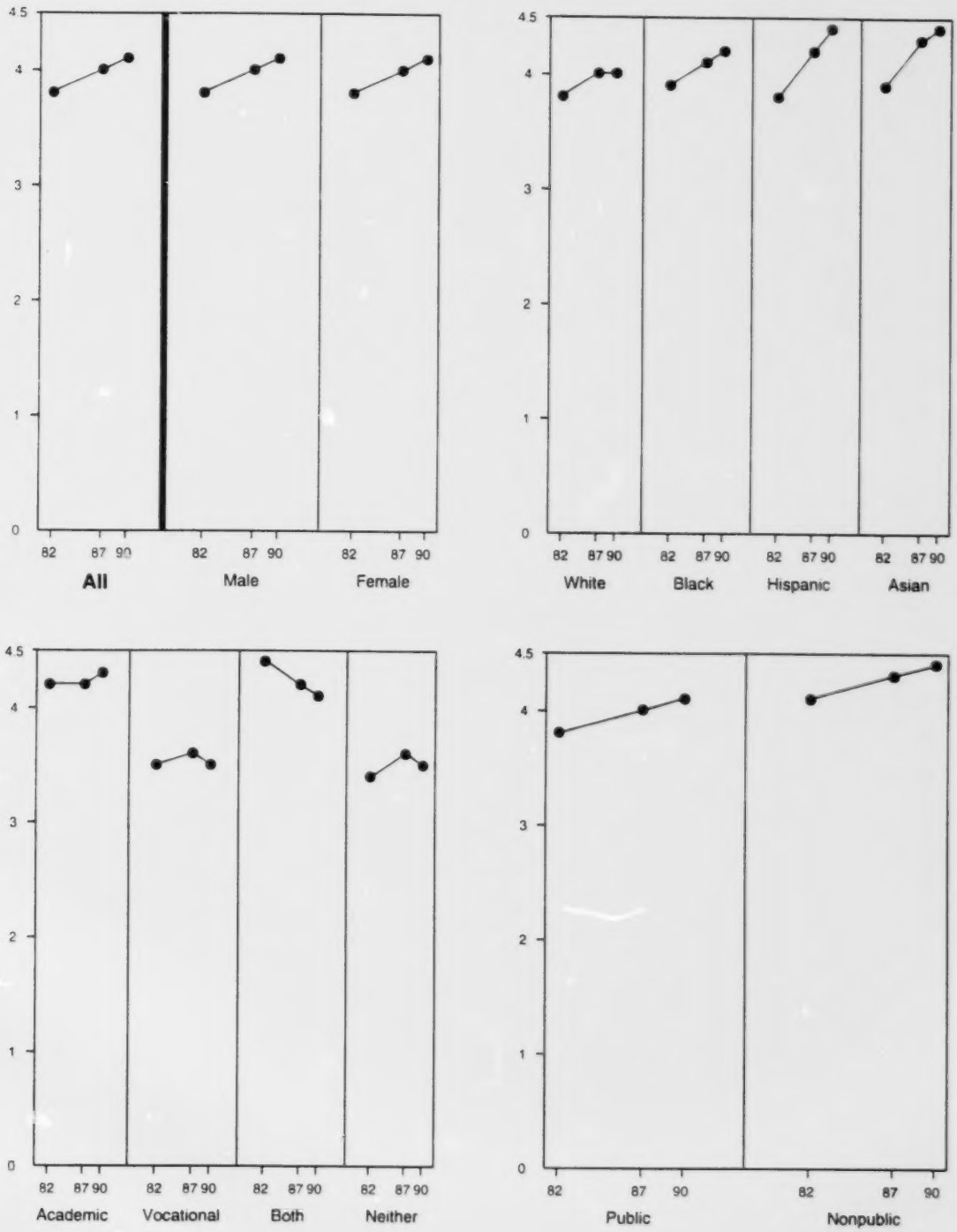
There were differences, however, among students in 1990.

- Hispanic students (4.4 units) and Asian/Pacific students (4.4 units) took more English than White students (4 units).
- Students in academic programs (4.3 units) took more English than students in the other programs (vocational: 3.5 units, both: 4.1 units, and neither: 3.5 units).
- Students attending nonpublic schools took more English (4.4 units) than students attending public schools (4.1 units).

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Table 13, p. A-74.

See Appendix Table 11 for data and standard errors.

Figure 11: Trends in the Average Number of Carnegie Units in English Taken by High School Students



History

On average, graduates had taken 2 Carnegie units of history in 1990, representing an increase over the 1.7 units taken in 1982 and the 1.9 units taken in 1987.

These gains applied to both males and females; for White, Black, Hispanic, and Asian/Pacific students; and for students from public and nonpublic schools. Students in academic programs showed an increase in history courses, but students in vocational and other programs showed no change.

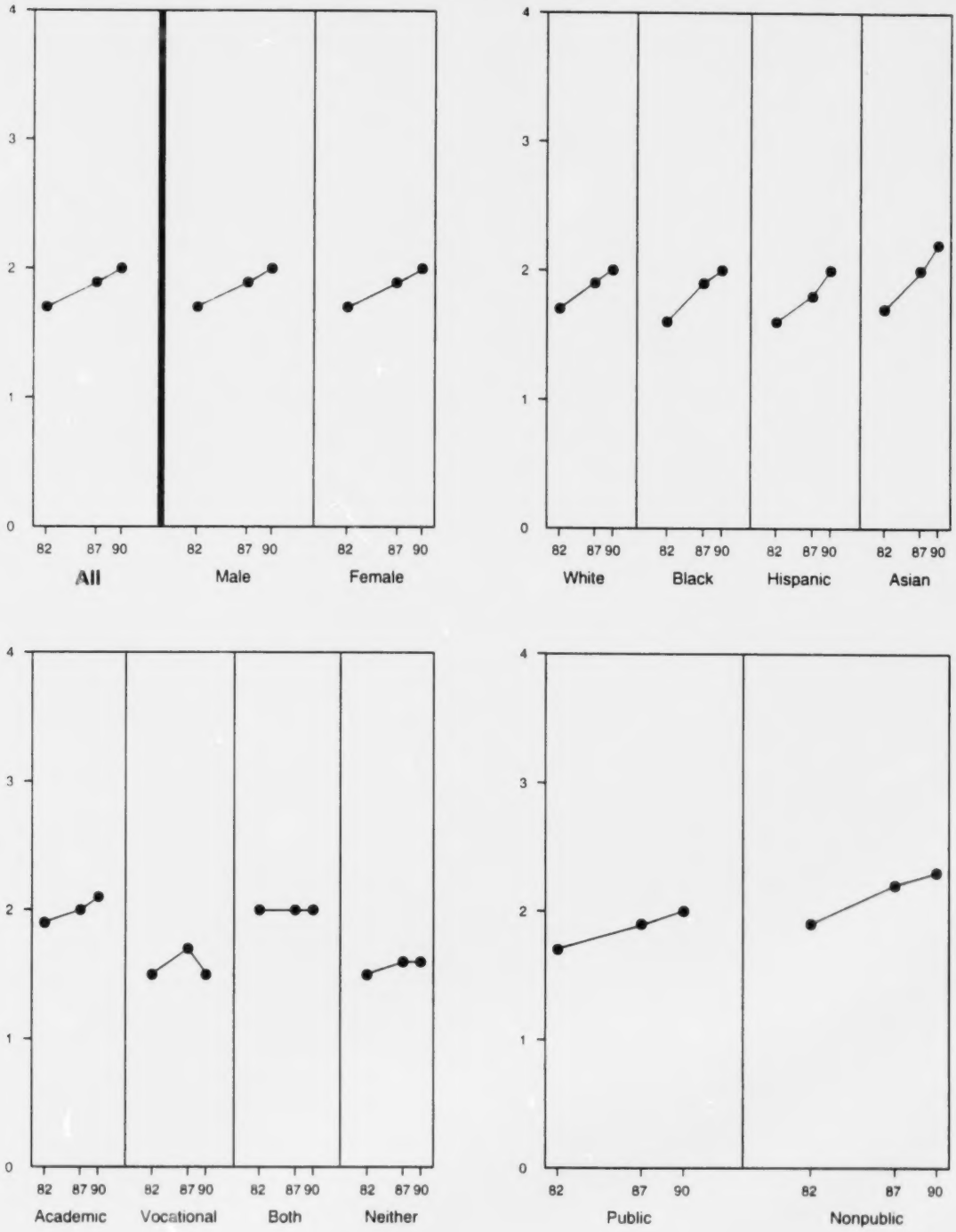
Among the class of 1990:

- There were no differences between males and females, nor among students of different racial/ethnic groups.
- Students who attended nonpublic schools took more history units (2.3) than students who attended public schools (2.0).
- Students in academic programs took more history than students in the vocational programs.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Table 13, p. A-77.

See Appendix Table 12 for data and standard errors.

Figure 12: Trends in the Average Number of Carnegie Units in History Taken by High School Students



Social Studies*

In 1990, American high school graduates took an average of 1.5 Carnegie units of social studies, unchanged from 1982 and 1987 levels. This stability was exhibited for males and females, students from all racial/ethnic groups, students in academic and vocational programs, and students in public and nonpublic schools.

Among 1990 graduates:

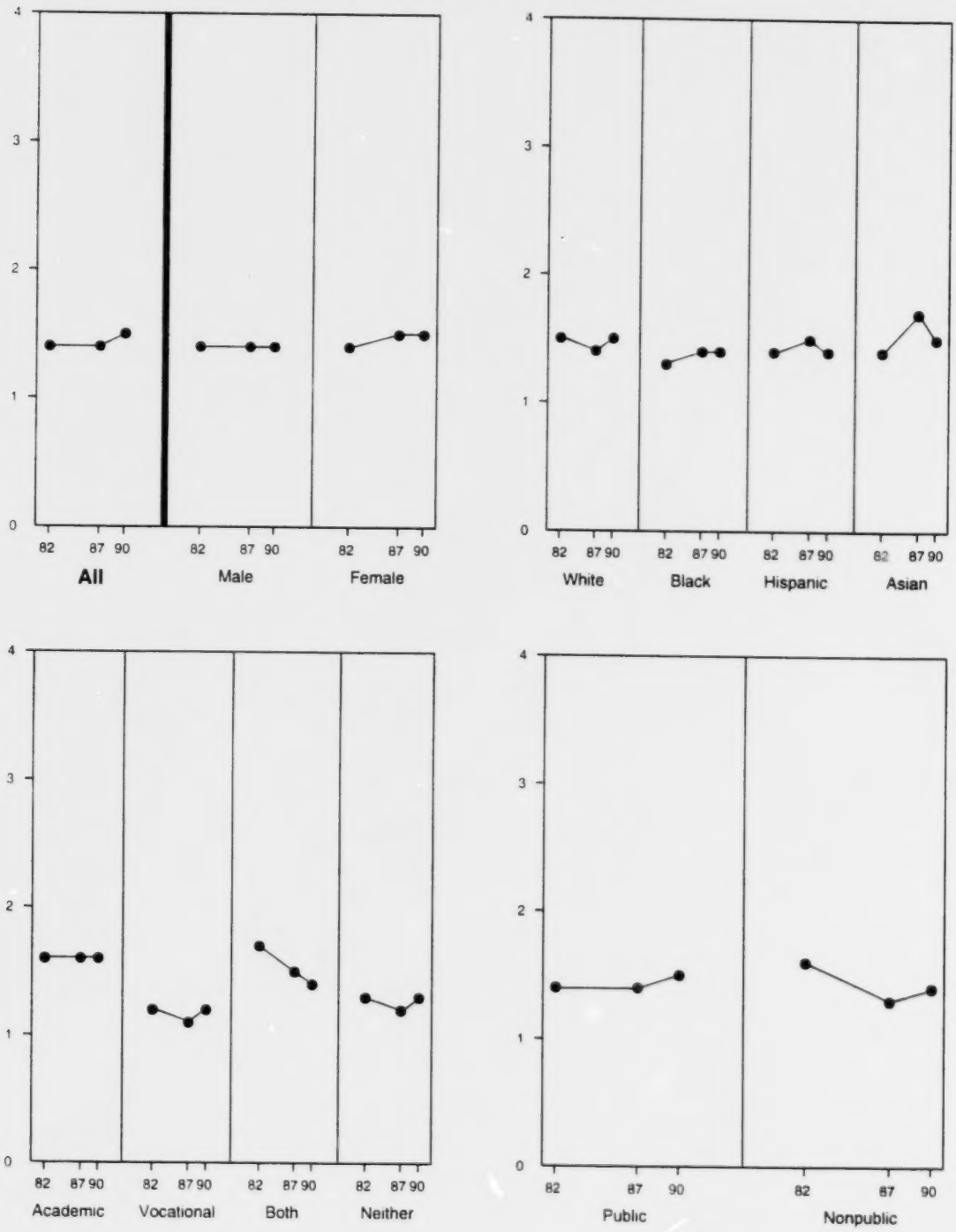
- The only differences observed were among students in different programs. Students in academic programs took more social studies units than students in all the other programs. Students in programs classified as both academic and vocational took less social studies in 1990 than they did in 1982.

*Other than history

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Table 13, p. A-80.

See Appendix Table 13 for data and standard errors.

Figure 13: Trends in the Average Number of Carnegie Units in Social Studies Taken by High School Students



Foreign Languages

1990 graduates took 1.6 Carnegie units of foreign language, up from 1.1 units in 1982. Most of the growth occurred between 1982 and 1987, with no significant change after that. This pattern was the same for males, Black and Asian/Pacific students, and students from all program tracks. Female students showed gains during each time interval, as did Hispanic students.

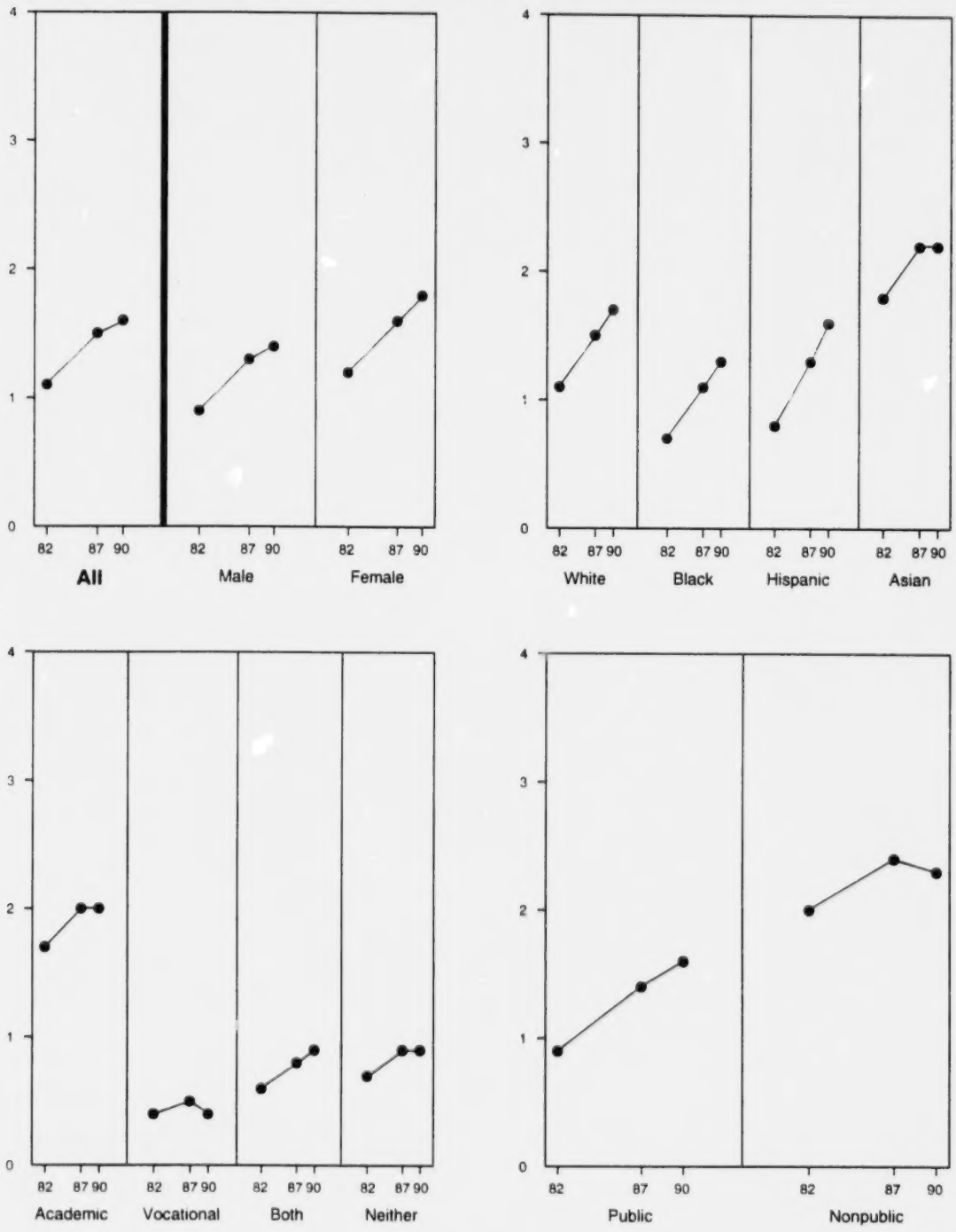
Among students of the class of 1990:

- Females took more foreign language than males.
- Asian/Pacific students took more than all other racial/ethnic groups, and Black students took less foreign language than any other group.
- Students in academic programs took 2 units of foreign language compared to only .4 of unit for vocational students and .9 of a unit for students enrolled in programs described as "both" and "neither."
- Students in nonpublic schools took more foreign language units (2.3 units) than students in public schools (1.6 units).

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Table 13, p. A-92.

See Appendix Table 14 for data and standard errors.

Figure 14: Trends in the Average Number of Carnegie Units in Foreign Language Taken by High School Students



Computer Science

In 1990, the average twelfth grader had taken .5 of a Carnegie unit of computer science, up from .1 of a unit in 1982 and .4 of a unit in 1987. This gain was shared by both males and females; by Black, Hispanic, Asian/Pacific, and White students; by students in academic, vocational, and mixed programs; and by students who attended both public and nonpublic schools. Most of this growth occurred between 1982 and 1987.

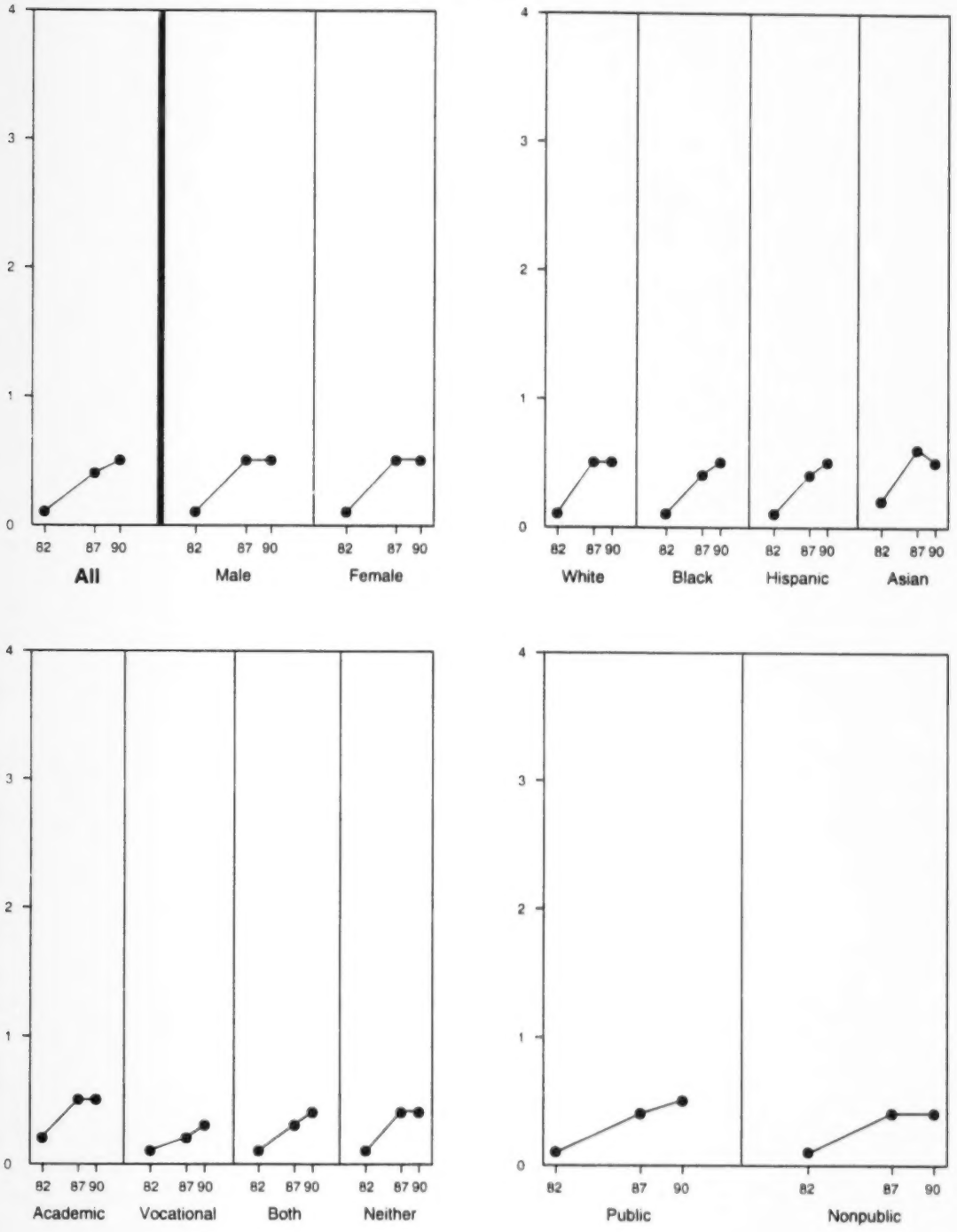
Among 1990 graduates, there were few differences in exposure to computer science, but:

- Students in academic programs took more computer science than students in vocational programs.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Table 13, p. A-86.

See Appendix Table 15 for data and standard errors.

Figure 15: Trends in the Average Number of Carnegie Units in Computer Science Taken by High School Students



Occupation-Specific Vocational Education

In 1990, the average high school graduate had accumulated 1.8 Carnegie units of occupation-specific vocational education courses, down from the 2 units students collected in 1987 and from the 2.1 units students collected in 1982.* Vocational education courses appear to be the exceptions to the rule of increased course-taking by students during the 1980s.

Occupation-specific vocational education courses show a downturn from 1982 to 1990 for males and females, and for all racial/ethnic groups (except for course-taking by Asian/Pacific students, which was stable at a low level). Both public and nonpublic school students also showed decreased course-taking in this area.

The only students who increased course-taking in this vocational area were those in vocational education programs, whose course-taking increased from 5.4 units in 1982 to 5.8 units in 1990. The course-taking by students in the other programs was stable.

Among groups of students:

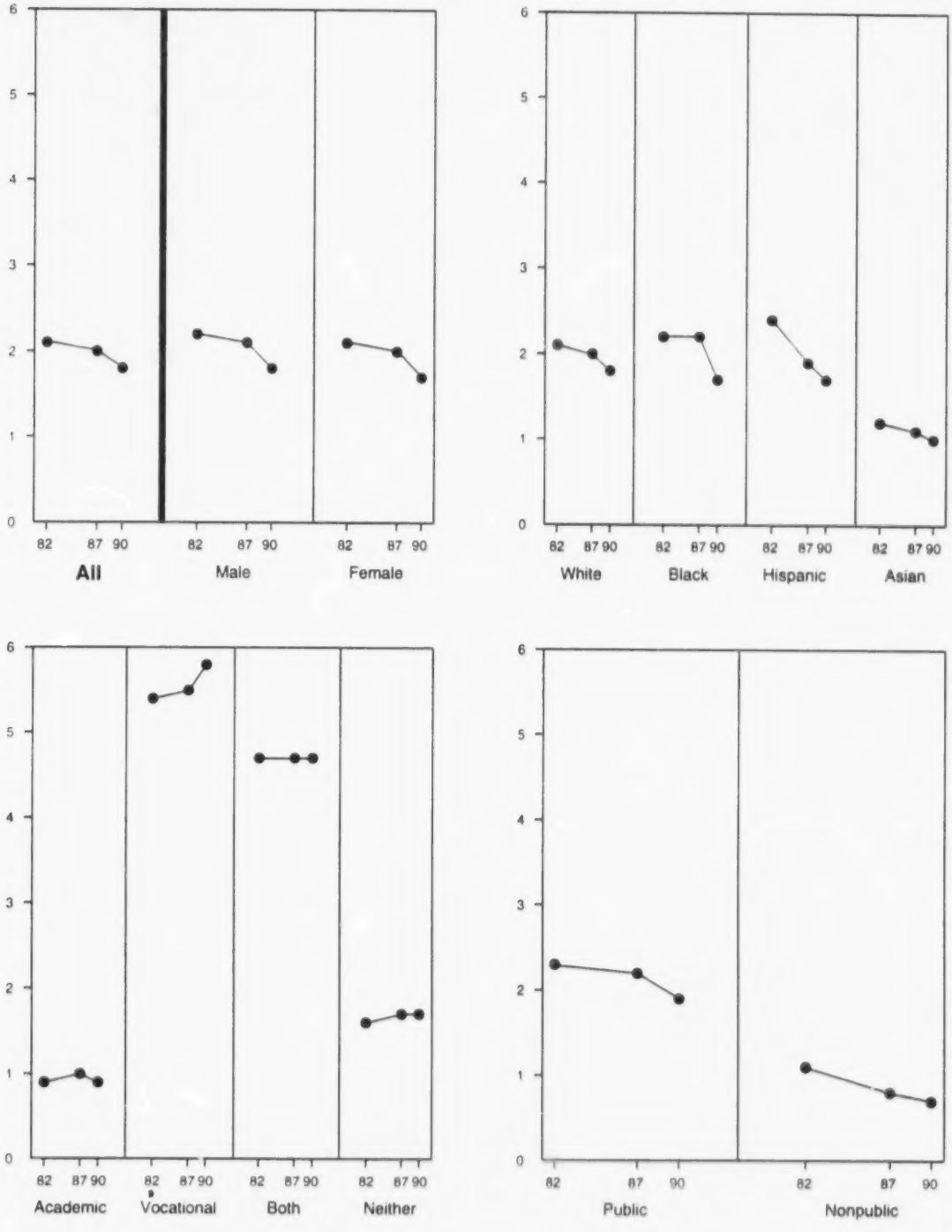
- Asian/Pacific students took less occupation-specific vocational education (1 unit) than the other racial/ethnic groups (about 1.7 units each).
- As would be expected, students in vocational education programs took much more occupation-specific vocational education than students in the other programs.
- Students in public schools took more vocational education than students who attended nonpublic schools.

*Occupation-specific vocational education includes courses such as carpentry, word processing, horticulture, and plumbing.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Table 13, p. A-98.

See Appendix Table 16 for data and standard errors.

Figure 16: Trends in the Average Number of Carnegie Units in Occupation-Specific Vocational Education Taken by High School Students



Non-Occupation-Specific Vocational Education

Students graduating in 1990 took 1.5 Carnegie units of nonoccupation-specific vocational education, on average.* This represents a decrease from 1982 (1.8 units) and 1987 (1.6 units). This downward trend applied to males and females, White and Hispanic students, students in academic and mixed tracks, and students attending both public and nonpublic schools. The trend for Black and Asian/Pacific students and for students enrolled in neither academic nor vocational programs was stable.

Among 1990 graduates:

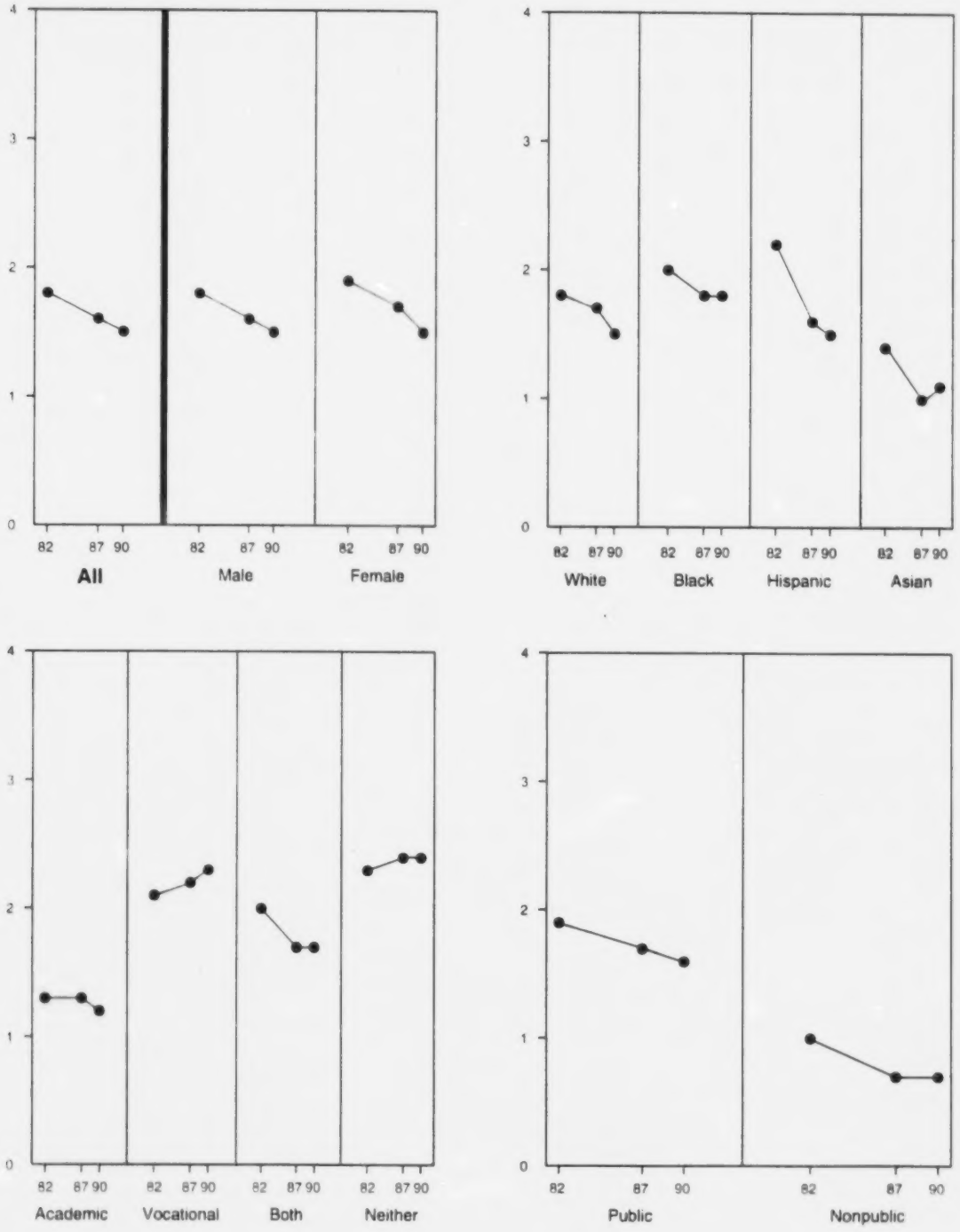
- Asian/Pacific students took less nonoccupation-specific vocational education, on average, than students in other racial/ethnic groups.
- Students in public schools took more nonoccupation-specific vocational education (1.6 units) than students in nonpublic schools (.7 of a unit).
- Students in academic programs took less nonoccupation-specific vocational education than students in other programs.

*Nonoccupation-specific vocational education includes courses such as business English, home economics, and consumer education.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Table 7, p. A-95.

See Appendix Table 17 for data and standard errors.

Figure 17: Trends in the Average Number of Carnegie Units in Nonoccupation-Specific Vocational Education Taken by High School Students



Visual and Performing Arts

There has been little change in the visual and performing arts. On average, high school graduates in 1990 had taken 1.5 Carnegie units during their time in high school. There was no change between 1982 and 1990 for males and for all racial/ethnic groups. Increases were registered for females, for students in academic programs, and for students attending public schools.

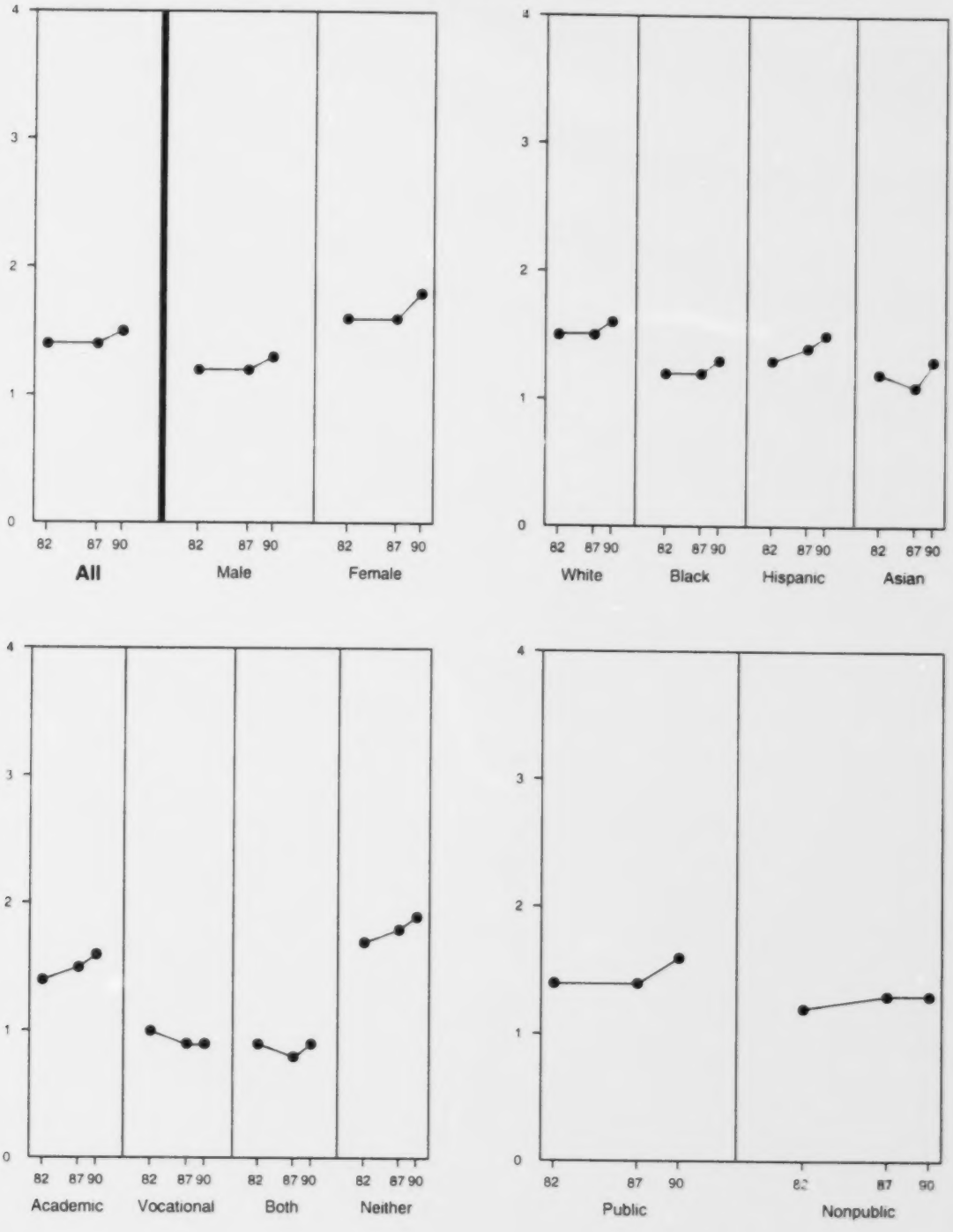
Among groups of students in 1990:

- Females took more visual and performing arts courses than males.
- White students took more than Black and Asian students.
- Students in academic programs accumulated more units than students in the other programs, except for students in programs described as neither academic nor vocational. These students took more visual and performing arts than did students in any of the other tracks.

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Table 13, p. A-101.

See Appendix Table 18 for data and standard errors.

Figure 18: Trends in the Average Number of Carnegie Units in Visual and Performing Arts Taken by High School Students



Physical Education, Health, and Sports

Students in the class of 1990 accumulated an average of 2 Carnegie units in physical education, health, and sports by the time they graduated. This average remained unchanged from 1982 and 1987. The level of course-taking was unchanged for all student subgroups as well.

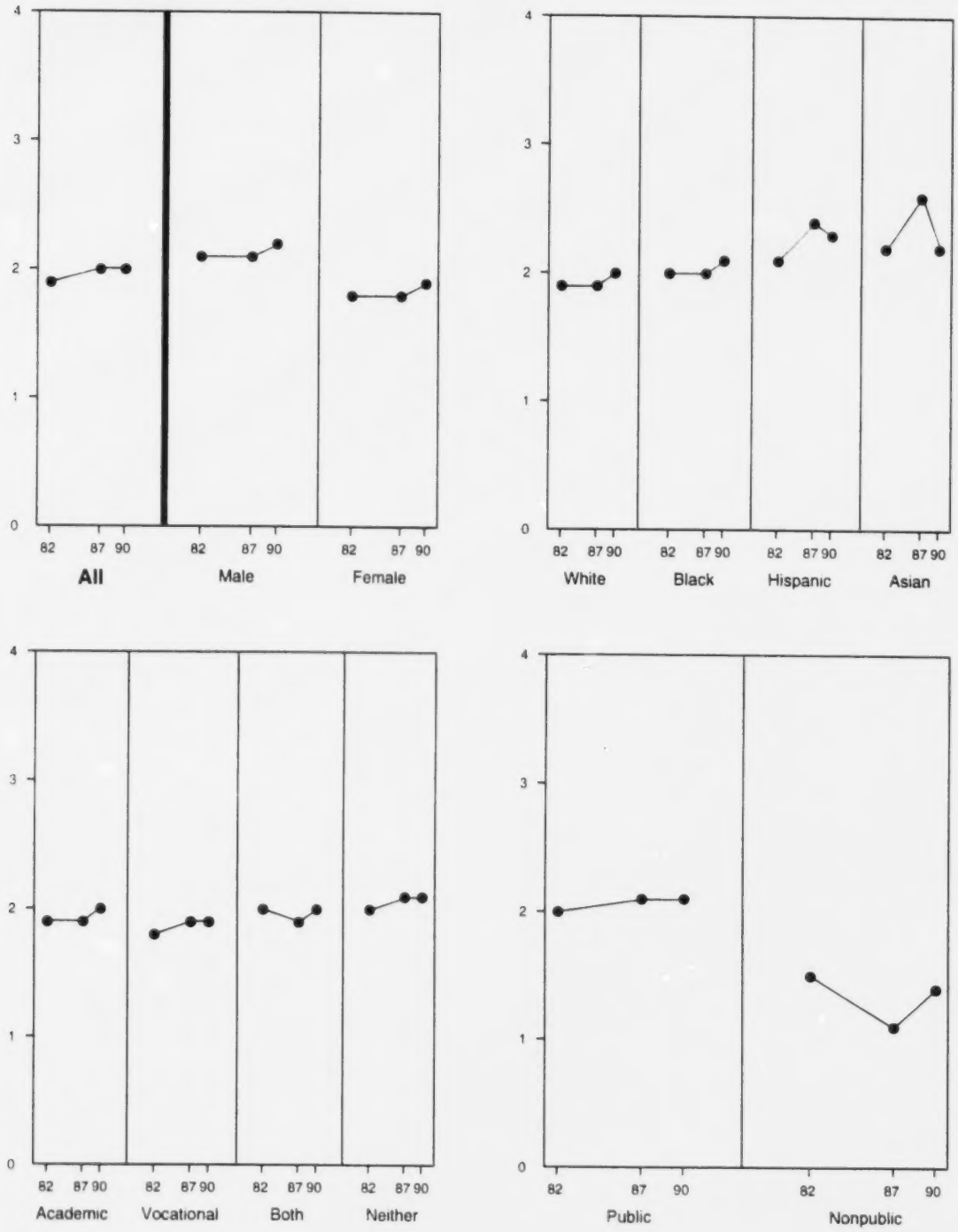
Within student groups in 1990:

- Males took more physical education, health, and sports than females.
- Hispanic students took more physical education, health, and sports than White students.
- Students from public schools (2.1 units) took more physical education, health, and sports than students from nonpublic schools (1.4 units).

Source: Stanley Legum et al. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, National Center for Education Statistics, April 1993, Table 13, p. A-104.

See Appendix Table 19 for data and standard errors.

Figure 19: Trends in the Average Number of Carnegie Units in Physical Education, Health, and Sports Taken by High School Students



Course-Taking of College-Bound Seniors*

The chart on the facing page shows the percentage of college-bound seniors in 1993 who took a variety of courses across the high school curriculum.

Within the English curriculum, the most popular choices were American literature (87 percent), grammar (83 percent), and composition (79 percent).

In the areas of art and music, music performance tops the list at 39 percent.

Within the social sciences and history curriculum, 96 percent of college-bound seniors took U.S. history. About three-quarters took world history/cultures and U.S. government/civics.

Spanish was the most popular foreign language course taken (60 percent). French was next, at 28 percent.

Within the natural sciences, 97 percent of college-bound seniors took biology. Eighty-two percent took chemistry.

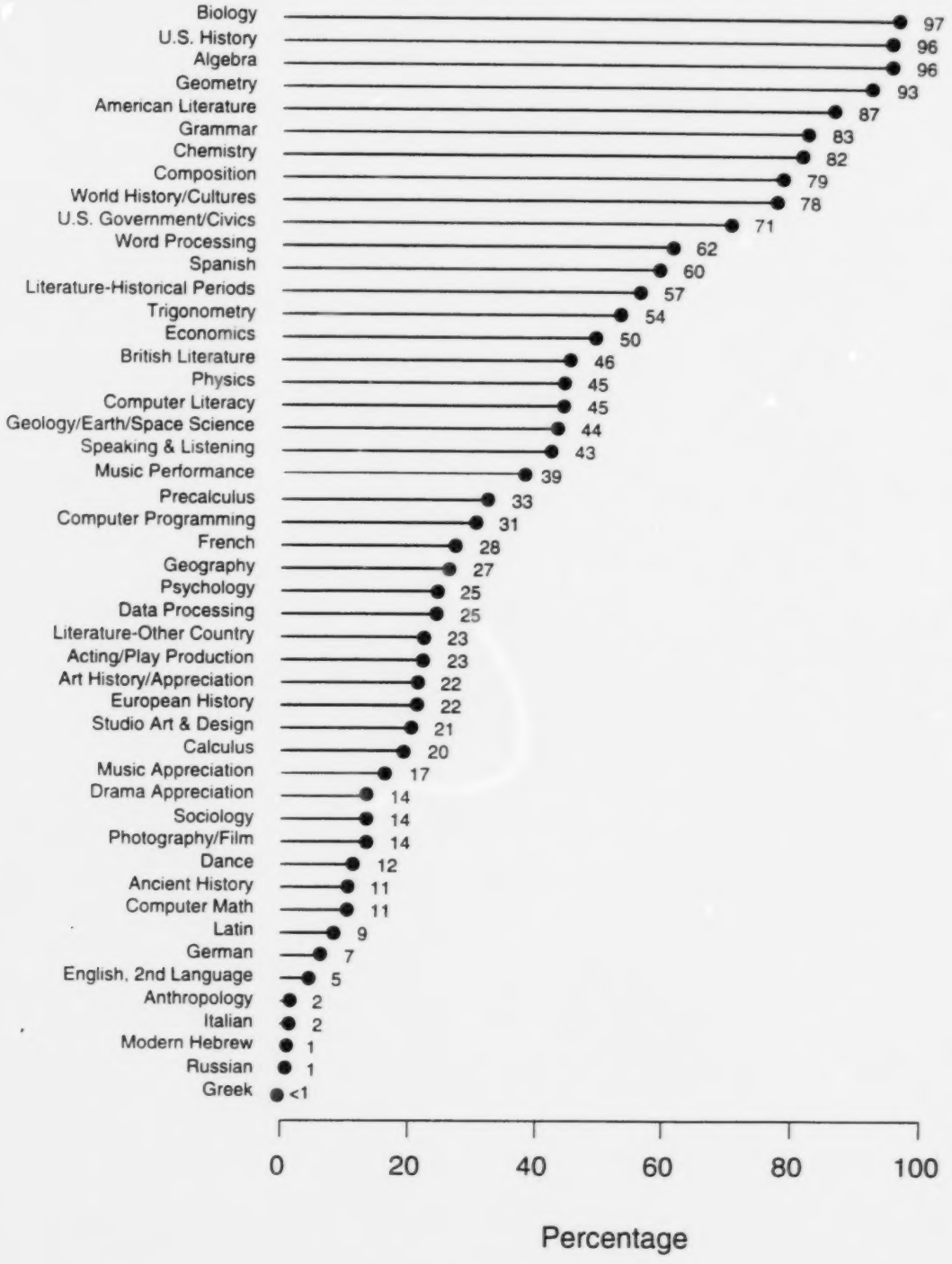
In mathematics, more than nine out of ten students took algebra and geometry. A little more than half took trigonometry, a third took precalculus, and a fifth took calculus.

Among computer courses, word processing was the most popular course (62 percent). Computer literacy was taken by 45 percent of college-bound seniors.

*College-bound seniors who took the Scholastic Assessment Test (SAT®). These test-takers represent 48 percent of all first-year students who enter college each year, and about 93 percent of those entering four-year institutions.

Source: *College-Bound Seniors: 1993 Profile of SAT and Achievement Test Takers*. The College Board.

Figure 20: Course-Taking of College-Bound Seniors, 1993



Advanced Placement

The Advanced Placement Program® (AP™) provides an opportunity for high school students to take college-level courses. Participating colleges grant credit and/or advanced placement to students who perform at a certain level on the AP examinations.

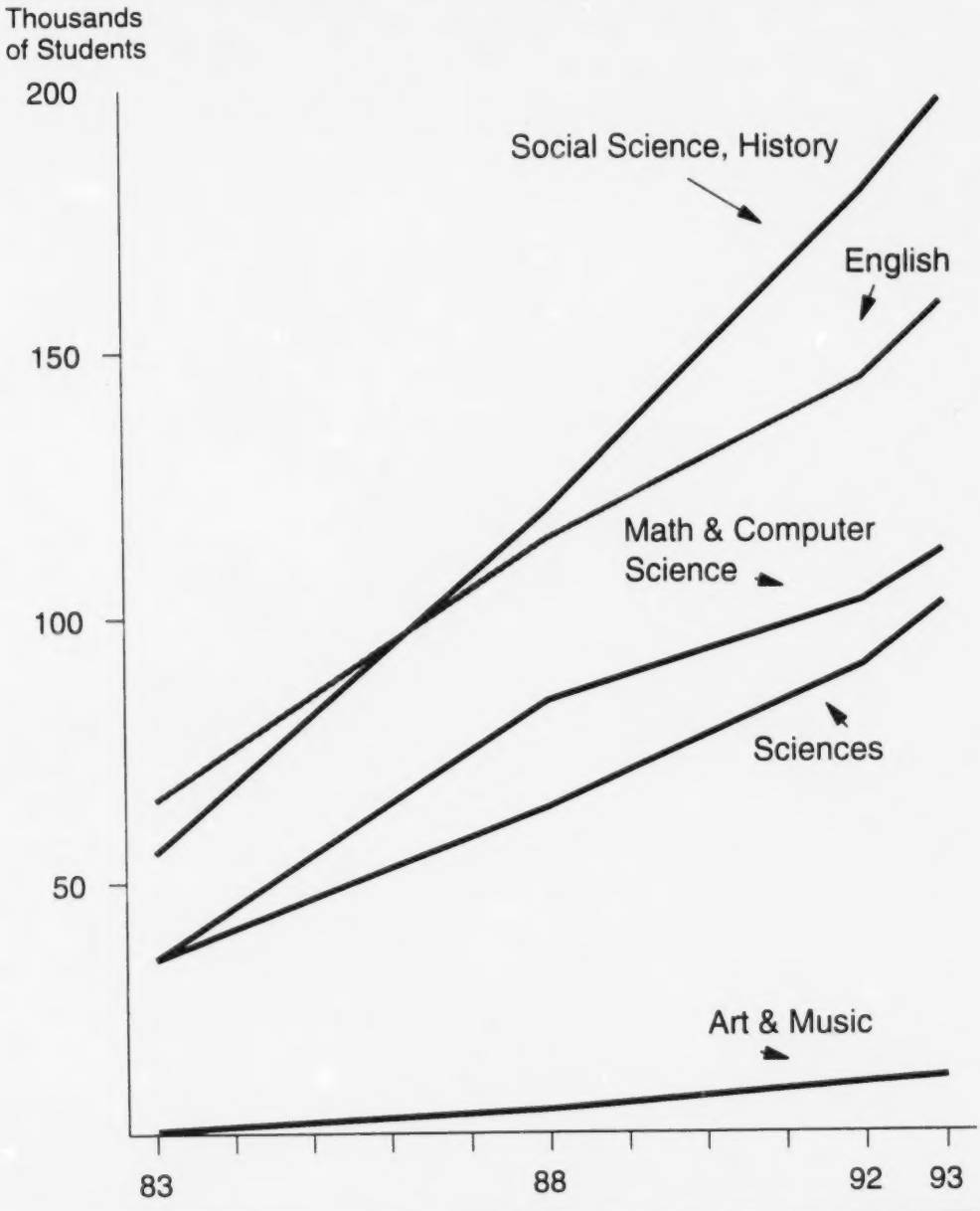
Growth in the number of high school students who take AP examinations is shown in Figure 21. Over a decade, the number of students has increased about 270 percent, from 157,973 in 1983 to 424,193 in 1993. All subject areas experienced growth — social science and history, English, mathematics and computer science, sciences, and art and music.

Students from all racial/ethnic groups have shared in this growth. The percentage of AP examinations taken by minority students has increased from 19.7 percent in 1988 to 26 percent in 1993. The breakdown is as follows:

	1988	**1993**
Black	3.5%	4.1%
Mexican American, Puerto Rican, Hispanic	4.6	7.0
Asian American	11.3	14.5
American Indian, Eskimo	0.3	0.4
TOTAL MINORITY	19.7	26.0

Source: *1993 AP Year Book* The College Board.

Figure 21: Trends in the Number of High School Students Taking Advanced Placement Examinations



Total Students	157,973	292,078	388,142	424,192

Instructional Emphasis in Mathematics: Learning Mathematics Facts and Concepts

Eighth-grade teachers of students sampled for the 1992 NAEP mathematics assessment completed questionnaires that solicited their views about the emphasis (heavy, moderate, or little or none) placed on the following specific mathematics skills and abilities:

- learning mathematics facts and concepts
- learning skills and procedures needed to solve problems
- developing reasoning ability to solve unique problems
- learning how to communicate ideas in mathematics effectively

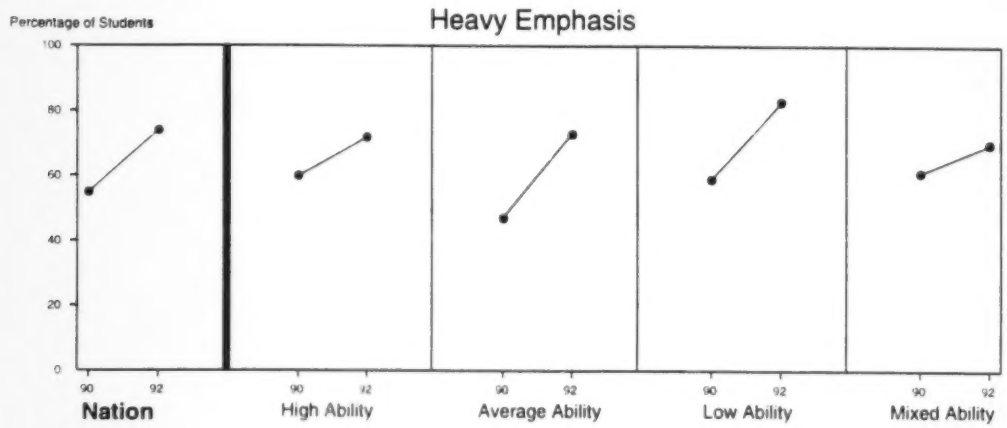
These skills are reflective of the curriculum goals established by the National Council of Teachers of Mathematics and get us a little bit closer to observing mathematics classroom content. Each of these skills and abilities is discussed in a following section of the report (for eighth graders). Data are available for 1990 and 1992 for the nation, and for students in different ability groups.

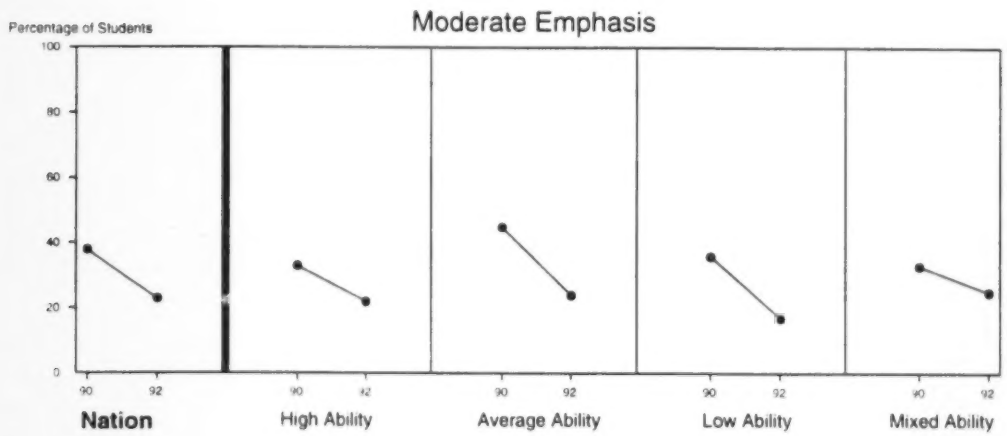
In 1992, teachers reported that about three-fourths of the students were receiving heavy emphasis in learning mathematics facts and concepts, an increase over 1990. Students in low ability groups were more likely to receive heavy emphasis in this area than students in average and high ability groups.

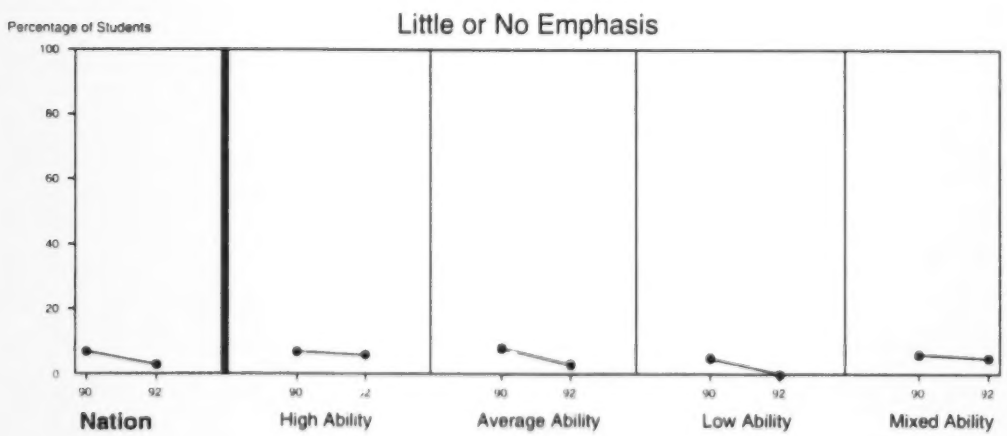
Source: National Center for Education Statistics. *Data Compendium for the NAEP 1992 Mathematics Assessment of the Nation and the States*, May 1993, pp.450.

See Appendix Table 20 for data and standard errors.

Figure 22: Percentage of Students Whose Teachers Emphasized Learning Mathematics Facts and Concepts, Grade 8, 1990 and 1992







Instructional Emphasis in Mathematics: Learning Skills and Procedures Needed to Solve Problems

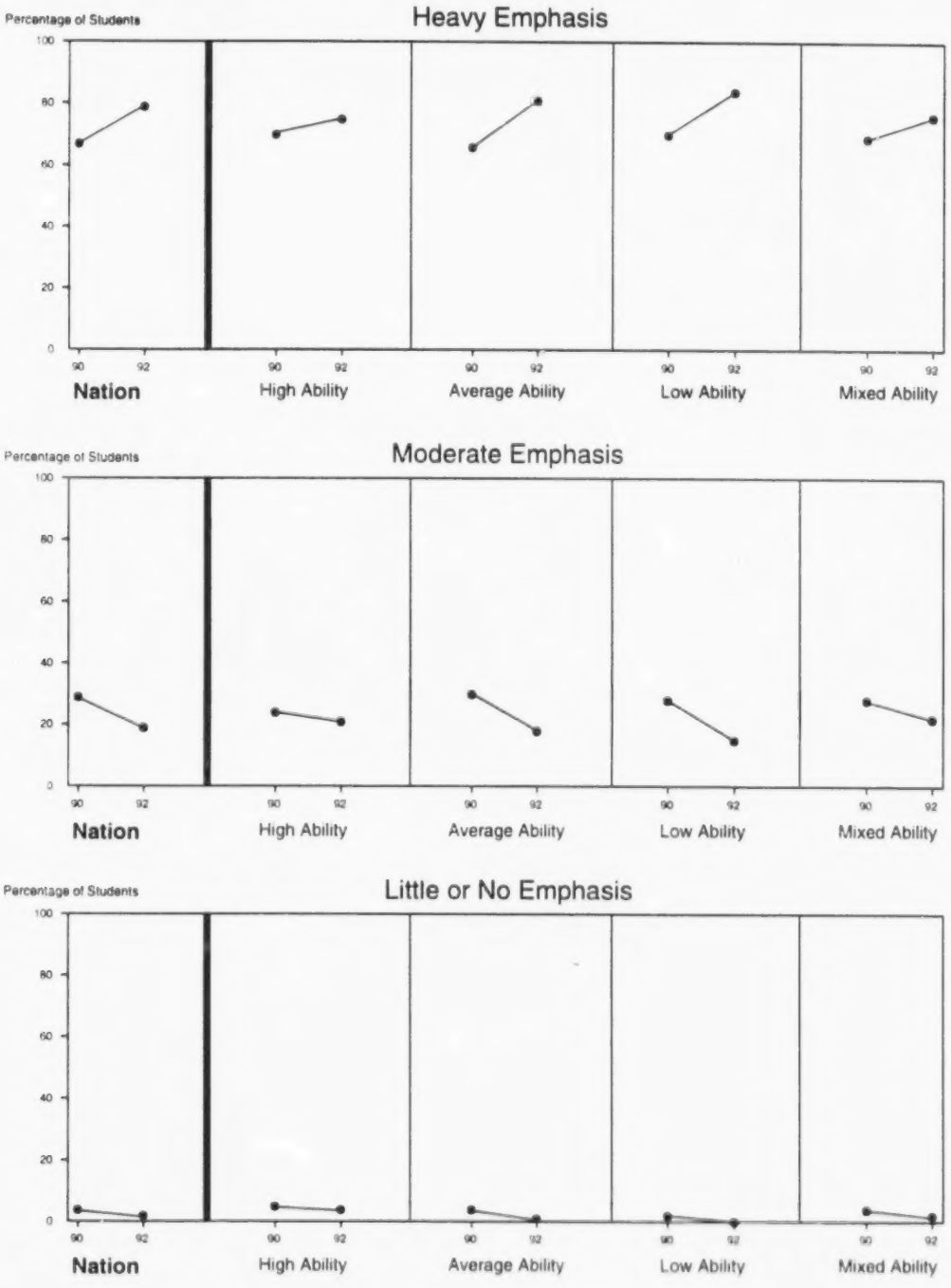
In 1992, teachers reported that skills and procedures needed to solve problems were heavily emphasized for eight out of 10 students, an increase over 1990.

This increase holds for students in both average and low ability groups. There was little change for students in high or mixed ability groups.

Source: National Center for Education Statistics. *Data Compendium for the NAEP 1992 Mathematics Assessment of the Nation and the States*, May 1993, pp.450.

See Appendix Table 20 for the data and for standard errors.

Figure 23: Percentage of Students Whose Teachers Emphasized Learning Skills and Procedures Needed to Solve Problems, Grade 8, 1990 and 1992



Instructional Emphasis in Mathematics: Developing Reasoning Ability to Solve Unique Problems

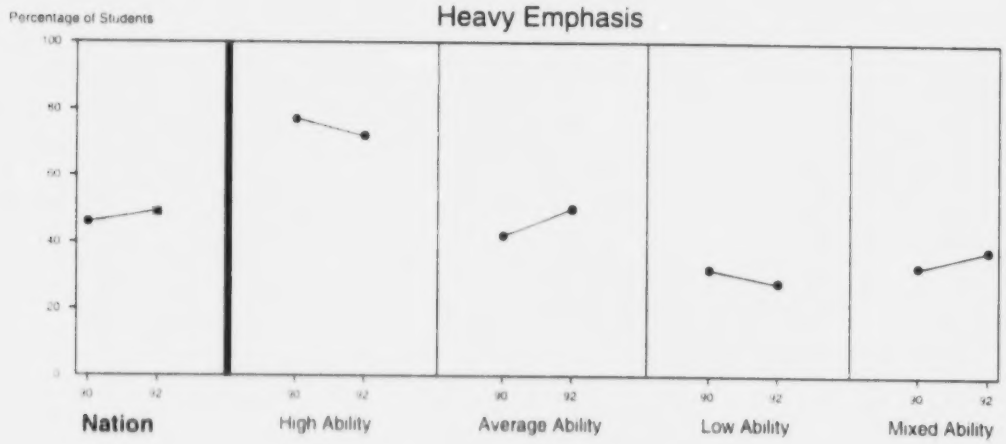
In 1992, about half of the eighth graders were receiving instruction emphasizing the development of reasoning ability to solve unique problems, unchanged from 1990.

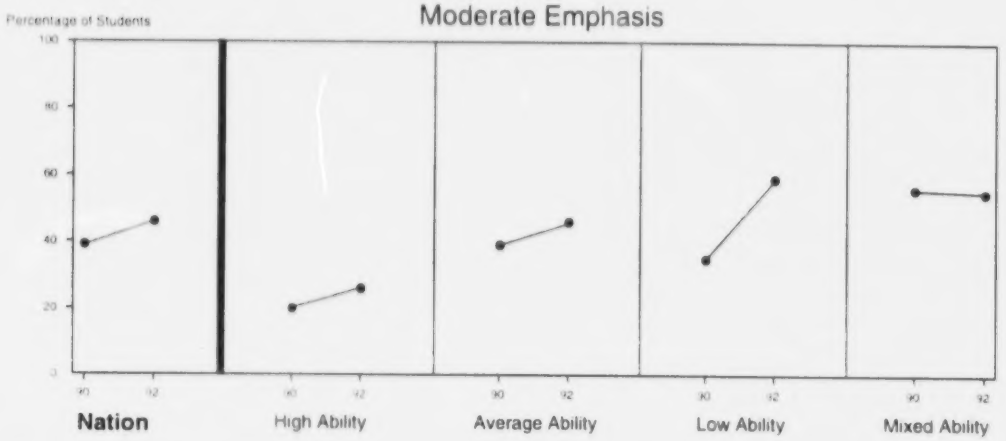
While 72 percent of students in high ability groups received instruction with this emphasis, only 28 percent and 38 percent, respectively, of students from low and mixed ability groups did. There was a substantial decrease, however, in the percentage of students in average and low ability groups who received little or no emphasis on developing reasoning ability. In addition, the percentage of eighth graders receiving a moderate emphasis on reasoning ability increased.

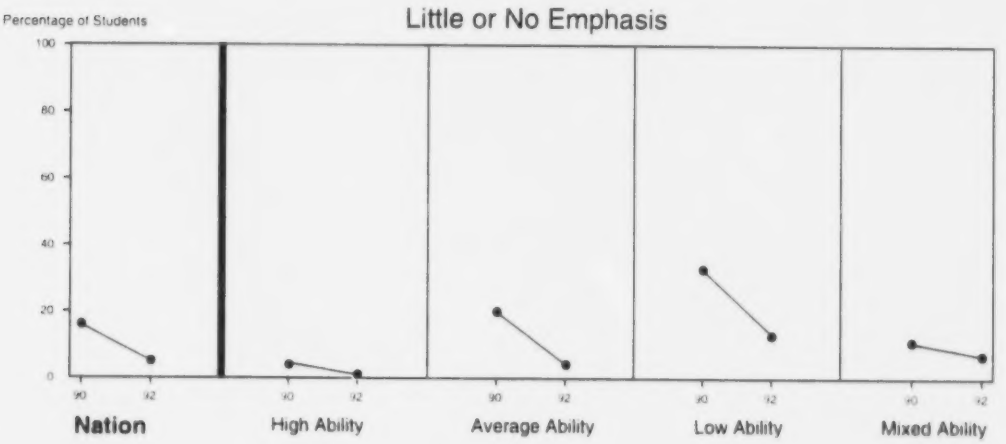
Source: National Center for Education Statistics. *Data Compendium for the NAEP 1992 Mathematics Assessment of the Nation and the States*, May 1993, pp.450.

See Appendix Table 20 for data and standard errors.

Figure 24: Percentage of Students Whose Teachers Emphasized Developing Reasoning Ability to Solve Unique Problems, Grade 8, 1990 and 1992







Instructional Emphasis in Mathematics: Learning How to Communicate Ideas in Mathematics Effectively

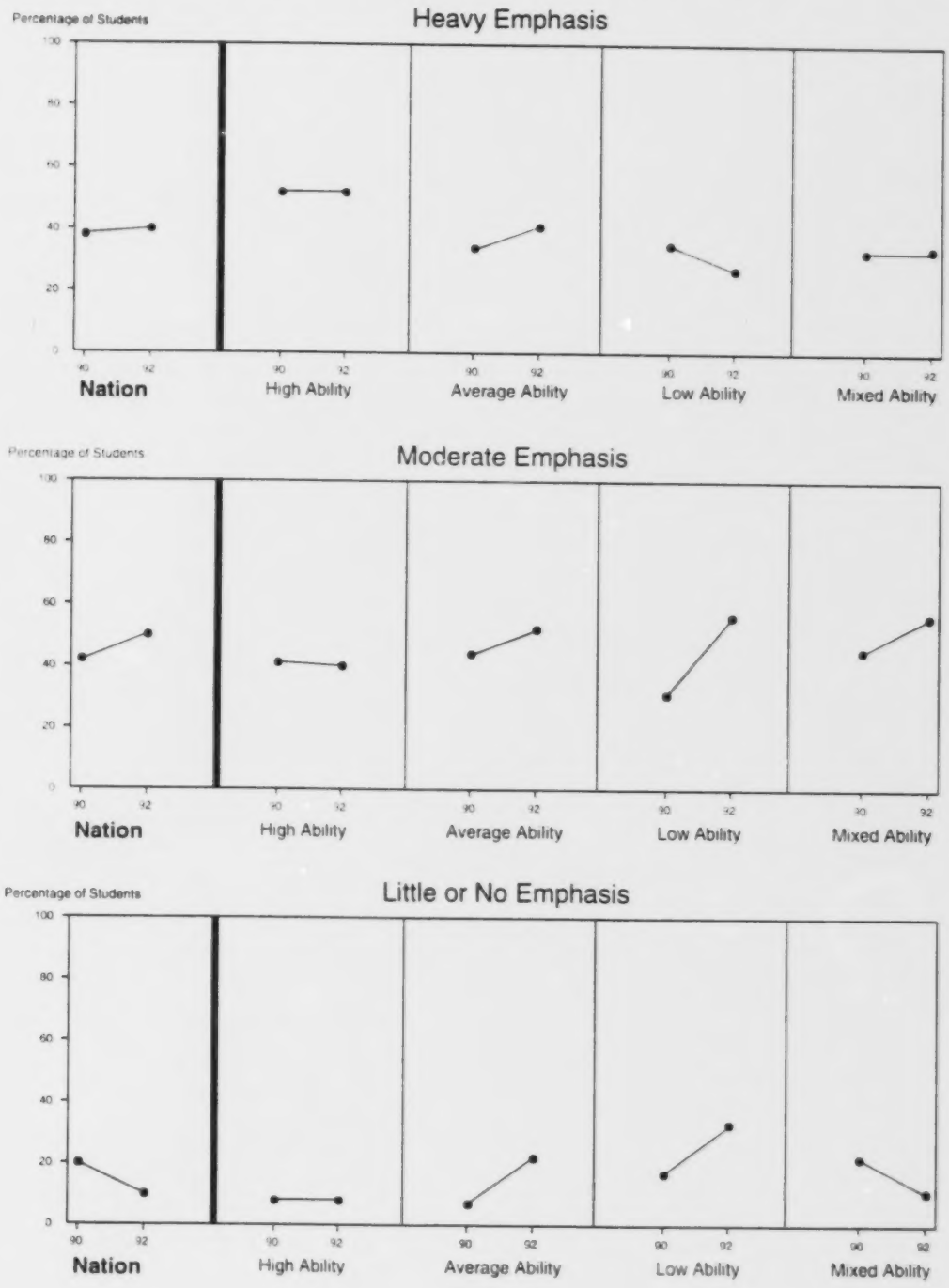
Teachers in 1992 reported that 40 percent of students were receiving a heavy instructional emphasis on learning how to communicate mathematics ideas, a percentage that was basically unchanged from 1990. However, the percentage of students receiving little or no emphasis in this area declined by half, from 20 percent in 1990 to 10 percent in 1992.

More than half of students in high ability groups received this instructional emphasis in 1992, however, compared to only 27 percent of students in low ability groups.

Source: National Center for Education Statistics. *Data Compendium for the NAEP 1992 Mathematics Assessment of the Nation and the States*, May 1993, p.450.

See Appendix Table 20 for data and standard errors.

Figure 25: Percentage of Students Whose Teachers Emphasized Learning How to Communicate Ideas in Mathematics Effectively, Grade 8, 1990 and 1992



State Variation in Instructional Emphasis in Mathematics

State-by-state NAEP data are also available on teachers' instructional emphasis in mathematics.* For learning mathematics facts and concepts, 25 states reported an increase in the percentage of their students who received a heavy instructional emphasis in this area between 1990 and 1992. For learning skills and procedures needed to solve problems, there was an increase in 18 states. Nine states had an increase in the percentage of their students who received a heavy instructional emphasis in developing reasoning ability to solve unique problems. Finally, five states reported an increase in emphasis on learning how to communicate ideas in mathematics effectively.

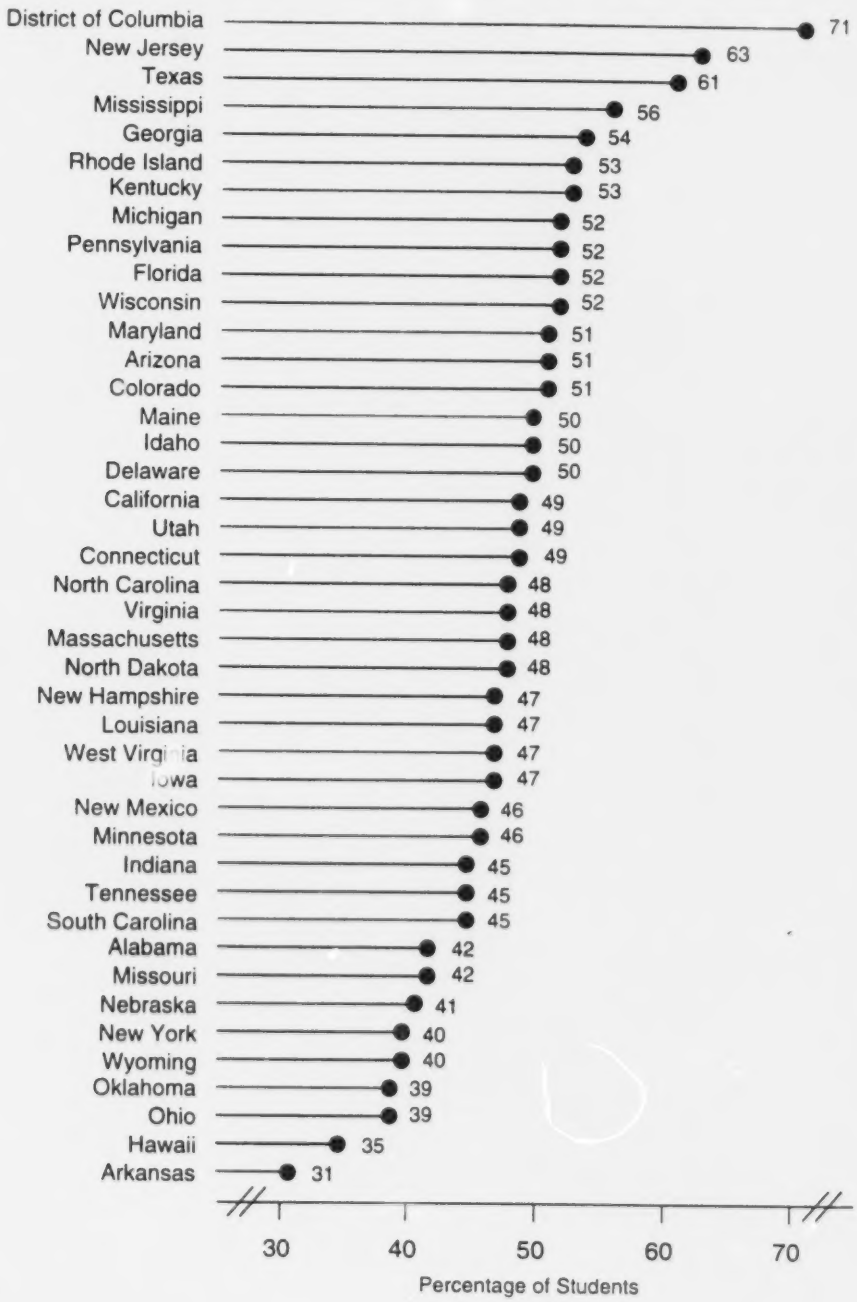
The variation among states can be seen in Figure 26, which shows the variation among states in developing reasoning ability to solve unique problems. The percentage of students receiving heavy instructional emphasis in this area ranges from a low of 31 percent in Arkansas to a high of 71 percent in the District of Columbia.

*Forty-one of the nation's states, the District of Columbia, Guam, and the Virgin Islands participated in the 1992 NAEP mathematics assessment.

Source: National Center for Education Statistics. *Data Compendium for the NAEP 1992 Mathematics Assessment of the Nation and the States*, May 1993, pp.453.

See Appendix Table 21 for data and standard errors.

Figure 26: Percentage of Students Whose Teachers Report That They Place Heavy Instructional Emphasis on Developing Reasoning Ability to Solve Unique Problems, Grade 8, 1992, by State



Appendix 1: Definition of Student Program

The student classification variable, "Student Program," has been defined as follows:

Academic = The student has earned at least 12 credits in the following core course areas: English, history, social studies other than history, mathematics, and/or science, and has not met the requirements for vocational track, below.

Vocational = The student has earned at least three credits in a single occupationally specific vocational education area and has not met the requirements for academic track, above.

Both = the student has met the requirement above for both academic and vocational tracks. It is possible that some students in this category have taken more vocational courses than some students in the vocational track.

Neither = The student has not met the requirements for either the academic or vocational track.

Source: National Center for Education Statistics. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates*, April 1993, p. 8.

Appendix Table 1
Trends in the Percentage of Students Taking a "Core Curriculum" in High School

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	17.3 (1.12)	12.0 (0.89)	1.9 (0.21)
Male	17.7 (1.19)	13.3 (1.24)	2.0 (0.32)
Female	16.9 (1.16)	10.9 (0.74)	1.7 (0.20)
White	18.1 (1.31)	12.7 (1.20)	2.2 (0.28)
Black	14.4 (1.67)	8.3 (1.23)	0.7 (0.32)
Hispanic	15.7 (1.88)	5.5 (0.9)	0.5 (0.13)
Asian	23.4 (2.22)	24.3 (2.77)	6.0 (1.51)
Academic	23.4 (1.43)	19.5 (1.39)	4.3 (0.50)
Vocational	N/A	N/A	N/A
Both	7.3 (0.92)	3.8 (0.74)	1.1 (0.31)
Neither	N/A	N/A	N/A
Public	16.9 (1.23)	11.4 (0.72)	1.7 (0.21)
Nonpublic	21.2 (2.20)	18.3 (4.65)	2.8 (0.94)

Appendix Table 2
Trends in the Percentage of Students Taking a "Minimum Academic Program" in High School

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	39.9 (1.66)	28.6 (1.24)	13.4 (0.53)
Male	40.7 (1.88)	30.1 (1.37)	14.3 (0.92)
Female	39.2 (1.66)	27.2 (1.32)	12.6 (0.77)
White	40.6 (1.82)	29.7 (1.46)	14.9 (0.64)
Black	41.3 (3.83)	24.4 (2.97)	10.1 (1.55)
Hispanic	32.7 (2.66)	17.9 (2.18)	6.3 (0.65)
Asian	51.2 (3.05)	48.3 (4.39)	21.0 (2.28)
Academic	53.4 (1.74)	45.1 (1.36)	29.9 (1.05)
Vocational	N/A	N/A	N/A
Both	29.9 (3.30)	18.2 (2.24)	16.9 (2.43)
Neither	N/A	N/A	N/A
Public	38.2 (1.81)	27.1 (1.22)	12.1 (0.57)
Nonpublic	56.6 (3.39)	42.4 (4.60)	24.5 (1.08)

Appendix Table 3
Trends in the Average Number of Carnegie Units in Mathematics Taken by High School Students

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	3.1 (.03)	3.0 (.03)	2.5 (.02)
Male	3.1 (.03)	3.0 (.03)	2.6 (.04)
Female	3.1 (.03)	2.9 (.03)	2.5 (.03)
White	3.1 (.04)	3.0 (.04)	2.6 (.02)
Black	3.1 (.07)	2.9 (.06)	2.4 (.05)
Hispanic	3.1 (.06)	2.8 (.05)	2.2 (.04)
Asian	3.5 (.06)	3.7 (.09)	3.1 (.09)
Academic	3.4 (.02)	3.5 (.02)	3.3 (.02)
Vocational	2.0 (.04)	2.0 (.03)	1.7 (.02)
Both	3.0 (0.3)	3.0 (.03)	3.0 (.14)
Neither	2.1 (.06)	2.1 (.03)	1.9 (.03)
Public	3.1 (.03)	2.9 (.03)	2.5 (.02)
Nonpublic	3.5 (.04)	3.4 (.06)	3.2 (.10)

Appendix Table 4
Trends in the Percentage of High School Students Taking Remedial Mathematics

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	23.6 (1.57)	24.9 (1.26)	32.7 (0.73)
Male	25.7 (1.71)	26.7 (1.45)	35.9 (0.99)
Female	21.7 (1.51)	23.2 (1.18)	29.6 (0.98)
White	20.0 (1.78)	20.6 (1.27)	27.5 (0.80)
Black	35.4 (2.26)	46.5 (1.90)	53.2 (2.25)
Hispanic	38.3 (3.31)	42.5 (3.46)	47.0 (1.60)
Asian	19.9 (2.71)	16.3 (2.74)	19.4 (2.37)
Academic	17.3 (1.16)	15.6 (1.00)	22.6 (0.85)
Vocational	49.4 (4.81)	43.4 (2.80)	45.5 (1.67)
Both	32.6 (2.40)	37.8 (2.92)	39.0 (2.60)
Neither	34.9 (4.31)	36.0 (2.60)	37.2 (1.07)
Public	25.0 (1.72)	26.8 (1.24)	34.5 (0.67)
Nonpublic	9.8 (1.26)	7.1 (1.78)	17.6 (3.37)

Appendix Table 5
Trends in the Percentage of High School Students Taking Algebra I, Algebra II, and Geometry

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	35.4 (1.30)	34.5 (1.37)	21.5 (0.67)
Male	34.4 (1.38)	33.9 (1.50)	22.2 (1.11)
Female	36.4 (1.45)	35.1 (1.50)	20.8 (0.93)
White	37.6 (1.57)	38.4 (1.60)	24.3 (0.80)
Black	29.2 (2.37)	24.8 (1.52)	13.8 (1.59)
Hispanic	30.1 (2.47)	20.6 (1.10)	10.8 (0.96)
Asian	38.0 (2.40)	41.3 (2.46)	29.8 (3.89)
Academic	45.6 (1.44)	49.2 (1.66)	40.8 (1.26)
Vocational	3.7 (0.68)	5.0 (0.66)	3.7 (0.48)
Both	27.1 (1.94)	31.4 (2.34)	26.1 (2.63)
Neither	7.1 (0.91)	8.8 (0.95)	6.9 (0.59)
Public	33.8 (1.34)	32.5 (1.57)	19.2 (0.62)
Nonpublic	51.2 (3.35)	53.1 (5.68)	40.6 (2.93)

Appendix Table 6
Trends in the Percentage of High School Students Taking Algebra II, Geometry, Trigonometry, and Calculus

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	2.2 (0.29)	2.4 (0.37)	.96 (0.13)
Male	2.5 (0.38)	2.9 (0.44)	1.2 (0.25)
Female	1.8 (0.25)	1.9 (0.32)	0.7 (0.14)
White	2.3 (0.32)	2.3 (0.38)	1.1 (0.17)
Black	1.1 (0.32)	1.2 (0.35)	0.2 (0.09)
Hispanic	1.5 (0.47)	2.2 (0.58)	0.5 (0.17)
Asian	6.5 (1.59)	14.5 (4.59)	2.5 (1.2)
Academic	3.1 (0.42)	3.9 (0.57)	2.3 (0.33)
Vocational	0 (0)	0 (0)	0 (0)
Both	0.3 (0.13)	0.6 (0.26)	0.1 (.01)
Neither	0 (0)	0 (0)	0 (0)
Public	2.3 (0.33)	2.5 (0.41)	0.8 (0.13)
Nonpublic	1.0 (0.23)	1.6 (0.48)	2.1 (0.55)

Appendix Table 7
Trends in the Average Number of Carnegie Units In Science Taken by High School Students

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	2.8 (.03)	2.6 (.05)	2.2 (.02)
Male	2.9 (.03)	2.7 (.05)	2.3 (.03)
Female	2.8 (.02)	2.5 (.05)	2.1 (.02)
White	2.9 (.03)	2.6 (.06)	2.3 (.02)
Black	2.7 (.07)	2.4 (.07)	2.0 (.06)
Hispanic	2.6 (.04)	2.3 (.06)	1.8 (.03)
Asian	3.0 (.11)	3.2 (.11)	2.6 (.08)
Academic	3.2 (.03)	3.1 (.04)	3.0 (.02)
Vocational	1.8 (.05)	1.7 (.05)	1.4 (.03)
Both	2.6 (.05)	2.5 (.06)	2.6 (.08)
Neither	1.9 (.03)	1.7 (.05)	1.5 (.03)
Public	2.8 (.03)	2.6 (.05)	2.1 (.02)
Nonpublic	3.1 (.06)	2.8 (.07)	2.6 (.08)

Appendix Table 8
Trends in the Percentage of High School Students Taking Biology

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	91.6 (0.93)	88.3 (0.88)	75.3 (0.80)
Male	90.4 (1.02)	87.0 (1.18)	73.3 (1.08)
Female	92.7 (0.91)	89.7 (0.67)	77.1 (0.86)
White	92.0 (0.99)	89.2 (1.00)	77.3 (0.88)
Black	91.0 (2.31)	86.2 (1.69)	70.1 (1.8)
Hispanic	90.3 (1.44)	85.4 (1.68)	67.2 (1.62)
Asian	90.5 (2.25)	91.5 (1.33)	82.2 (2.45)
Academic	95.7 (0.59)	95.8 (0.55)	91.8 (0.54)
Vocational	73.9 (3.4)	72.3 (3.04)	58.4 (2.23)
Both	95.5 (0.88)	92.0 (2.03)	87.7 (2.31)
Neither	77.7 (3.21)	73.4 (2.0)	62.2 (1.38)
Public	91.1 (1.03)	87.5 (0.96)	73.4 (0.86)
Nonpublic	97.0 (0.48)	96.4 (1.23)	90.8 (1.81)

Appendix Table 9
Trends in the Percentage of High School Students Taking Biology and Chemistry

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	48.2 (1.26)	43.0 (1.11)	28.0 (0.63)
Male	47.2 (1.39)	43.7 (1.34)	27.9 (1.12)
Female	49.1 (1.36)	42.3 (1.19)	28.1 (0.93)
White	50.9 (1.43)	46.0 (1.29)	31.3 (0.7)
Black	39.6 (2.19)	28.6 (1.69)	18.3 (1.39)
Hispanic	36.8 (2.61)	28.2 (1.44)	13.9 (1.03)
Asian	60.5 (2.94)	66.0 (3.9)	46.9 (3.22)
Academic	63.1 (1.25)	64.1 (1.22)	55.7 (0.89)
Vocational	4.0 (0.84)	3.9 (0.65)	3.5 (0.67)
Both	29.8 (2.21)	26.1 (2.22)	28.0 (2.49)
Neither	9.9 (1.73)	9.9 (0.84)	7.5 (0.47)
Public	46.5 (1.37)	40.2 (1.15)	25.8 (0.58)
Nonpublic	65.3 (2.63)	69.3 (3.16)	46.6 (3.6)

Appendix Table 10
Trends in the Percentage of High School Students Taking Biology, Chemistry, and Physics

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	18.9 (0.71)	16.8 (.02)	10.5 (0.43)
Male	22.1 (0.81)	20.8 (.02)	13.3 (0.64)
Female	16.0 (0.77)	12.9 (.02)	8.0 (0.51)
White	20.7 (0.82)	17.9 (.02)	12.1 (0.49)
Black	12.1 (1.26)	8.8 (.02)	4.6 (0.72)
Hispanic	10.2 (1.20)	8.2 (.02)	3.9 (0.45)
Asian	33.8 (2.39)	42.4 (.04)	27.3 (3.21)
Academic	26.3 (0.87)	27.1 (.02)	24.0 (0.81)
Vocational	0.3 (.07)	.06 (.08)	.19 (.09)
Both	5.8 (0.83)	5.5 (0.95)	5.1 (1.09)
Neither	1.0 (0.47)	.13 (.05)	0.6 (.016)
Public	17.9 (0.71)	15.9 (0.82)	9.7 (0.46)
Nonpublic	28.3 (1.97)	25.2 (2.32)	17.3 (1.79)

Appendix Table 11
Trends in the Average Number of Carnegie Units in English Taken by High School Students

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	4.1 (.04)	4.0 (.02)	3.8 (.03)
Male	4.1 (.04)	4.0 (.02)	3.8 (.03)
Female	4.1 (.04)	4.1 (.02)	3.8 (.03)
White	4.0 (.04)	4.0 (.02)	3.8 (.03)
Black	4.2 (.05)	4.1 (.05)	3.9 (.06)
Hispanic	4.4 (.13)	4.2 (.05)	3.8 (.04)
Asian	4.4 (.13)	4.3 (.06)	3.9 (.09)
Academic	4.3 (.04)	4.2 (.02)	4.2 (.03)
Vocational	3.5 (.05)	3.6 (.03)	3.5 (.03)
Both	4.1 (.03)	4.2 (.04)	4.4 (.10)
Neither	3.5 (.08)	3.6 (.04)	3.4 (.04)
Public	4.1 (.04)	4.0 (.02)	3.8 (.03)
Nonpublic	4.4 (.08)	4.3 (.07)	4.1 (.09)

Appendix Table 12
Trends in the Average Number of Carnegie Units in History Taken by High School Students

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	2.0 (.03)	1.9 (.02)	1.7 (.02)
Male	2.0 (.04)	1.9 (.03)	1.7 (.02)
Female	2.0 (.04)	1.9 (.02)	1.7 (.03)
White	2.0 (.04)	1.9 (.03)	1.7 (.02)
Black	2.0 (.07)	1.9 (.06)	1.6 (.04)
Hispanic	2.0 (.06)	1.8 (.04)	1.6 (.02)
Asian	2.2 (.16)	2.0 (.07)	1.7 (.08)
Academic	2.1 (.04)	2.0 (.03)	1.9 (.02)
Vocational	1.5 (.06)	1.7 (.04)	1.5 (.03)
Both	2.0 (.05)	2.0 (.04)	2.0 (.10)
Neither	1.6 (.04)	1.6 (.03)	1.5 (.02)
Public	2.0 (.04)	1.9 (.02)	1.7 (.02)
Nonpublic	2.3 (.08)	2.2 (.10)	1.9 (.07)

Appendix Table 13
Trends in the Average Number of Carnegie Units in Social Studies Taken by High School Students

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	1.5 (.03)	1.4 (.05)	1.4 (.02)
Male	1.4 (.03)	1.4 (.05)	1.4 (.02)
Female	1.5 (.03)	1.5 (.05)	1.4 (.03)
White	1.5 (.03)	1.4 (.05)	1.5 (.02)
Black	1.4 (.06)	1.4 (.05)	1.3 (.05)
Hispanic	1.4 (.07)	1.5 (.10)	1.4 (.03)
Asian	1.5 (.09)	1.7 (.19)	1.4 (.07)
Academic	1.6 (.03)	1.6 (.05)	1.6 (.03)
Vocational	1.2 (.06)	1.1 (.06)	1.2 (.03)
Both	1.4 (.05)	1.5 (.05)	1.7 (.08)
Neither	1.3 (.04)	1.2 (.04)	1.3 (.03)
Public	1.5 (.03)	1.4 (.05)	1.4 (.02)
Nonpublic	1.4 (.09)	1.3 (.12)	1.6 (.09)

Appendix Table 14
Trends in the Average Number of Carnegie Units in Foreign Languages Taken by High School Students

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	1.6 (.04)	1.5 (.05)	1.1 (.03)
Male	1.4 (.04)	1.3 (.05)	0.9 (.04)
Female	1.8 (.04)	1.6 (.06)	1.2 (.03)
White	1.7 (.05)	1.5 (.06)	1.1 (.03)
Black	1.3 (.07)	1.1 (.07)	0.7 (.06)
Hispanic	1.6 (.06)	1.3 (.06)	0.8 (.03)
Asian	2.2 (.13)	2.2 (.12)	1.8 (.10)
Academic	2.0 (.04)	2.0 (.06)	1.7 (.04)
Vocational	0.4 (.04)	0.5 (.03)	0.4 (.02)
Both	0.9 (.05)	0.8 (.06)	0.6 (.04)
Neither	0.9 (.04)	0.9 (.05)	0.7 (.02)
Public	1.6 (.04)	1.4 (.05)	0.9 (.02)
Nonpublic	2.3 (.08)	2.4 (.16)	2.0 (.13)

Appendix Table 15
Trends in the Average Number of Carnegie Units in Computer Science Taken by High School Students

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	0.5 (.02)	0.4 (.02)	0.1 (.01)
Male	0.5 (.02)	0.5 (.02)	0.1 (.01)
Female	0.5 (.02)	0.4 (.02)	0.1 (.01)
White	0.5 (.02)	0.5 (.02)	0.1 (.01)
Black	0.5 (.05)	0.4 (.02)	0.1 (.01)
Hispanic	0.5 (.04)	0.4 (.02)	0.1 (.01)
Asian	0.5 (.03)	0.6 (.04)	0.2 (.05)
Academic	0.5 (.02)	0.5 (.02)	0.2 (.01)
Vocational	0.3 (.03)	0.2 (.02)	0.1 (.01)
Both	0.4 (.02)	0.3 (.03)	0.1 (.05)
Neither	0.4 (.03)	0.4 (.03)	0.1 (.01)
Public	0.5 (.02)	0.4 (.02)	0.1 (.01)
Nonpublic	0.4 (.03)	0.4 (.06)	0.1 (.02)

Appendix Table 16
Trends in the Average Number of Carnegie Units in Occupation-Specific Vocational Education Taken by High School Students

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	1.8 (.05)	2.0 (.05)	2.1 (.04)
Male	1.8 (.05)	2.1 (.06)	2.2 (.05)
Female	1.7 (.06)	2.0 (.06)	2.1 (.06)
White	1.8 (.05)	2.0 (.06)	2.1 (.04)
Black	1.7 (.09)	2.2 (.10)	2.2 (.12)
Hispanic	1.7 (.12)	1.9 (.10)	2.4 (.09)
Asian	1.0 (.10)	1.1 (.15)	1.2 (.13)
Academic	0.9 (.03)	1.0 (.03)	0.9 (.02)
Vocational	5.8 (.11)	5.5 (.10)	5.4 (.07)
Both	4.7 (.07)	4.7 (.07)	4.7 (.10)
Neither	1.7 (.06)	1.7 (.04)	1.6 (.04)
Public	1.9 (.05)	2.2 (.04)	2.3 (.04)
Nonpublic	0.7 (.09)	0.8 (.11)	1.1 (.12)

Appendix Table 17
Trends in the Average Number of Carnegie Units in Nonoccupation-Specific Vocational Education Taken by High School Students

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	1.5 (.04)	1.6 (.05)	1.8 (.03)
Male	1.5 (.04)	1.6 (.05)	1.8 (.05)
Female	1.5 (.04)	1.7 (.06)	1.9 (.03)
White	1.5 (0.4)	1.7 (.07)	1.8 (.04)
Black	1.8 (.10)	1.8 (.05)	2.0 (.05)
Hispanic	1.5 (.08)	1.6 (.04)	2.2 (.05)
Asian	1.1 (.13)	1.0 (.11)	1.4 (.10)
Academic	1.2 (.03)	1.3 (.06)	1.3 (.03)
Vocational	2.3 (.06)	2.2 (.07)	2.1 (.05)
Both	1.7 (.05)	1.7 (.06)	2.0 (.10)
Neither	2.4 (.13)	2.4 (.10)	2.3 (.05)
Public	1.6 (.04)	1.7 (.05)	1.9 (.03)
Nonpublic	0.7 (.07)	0.7 (.14)	1.0 (.09)

Appendix Table 18
Trends in the Average Number of Carnegie Units in Visual and Performing Arts Taken by High School Students

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	1.5 (.04)	1.4 (.04)	1.4 (.03)
Male	1.3 (.04)	1.2 (.04)	1.2 (.04)
Female	1.8 (.04)	1.6 (.05)	1.6 (.04)
White	1.6 (.05)	1.5 (.06)	1.5 (.03)
Black	1.3 (.05)	1.2 (.06)	1.2 (.05)
Hispanic	1.5 (.07)	1.4 (.06)	1.3 (.05)
Asian	1.3 (.07)	1.1 (.08)	1.2 (.14)
Academic	1.6 (.04)	1.5 (.05)	1.4 (.04)
Vocational	0.9 (.08)	0.9 (.07)	1.0 (.05)
Both	0.9 (.05)	0.8 (.05)	0.9 (.07)
Neither	1.9 (.07)	1.8 (.06)	1.7 (.04)
Public	1.6 (.04)	1.4 (.04)	1.4 (.03)
Nonpublic	1.3 (.07)	1.3 (.13)	1.2 (.10)

Appendix Table 19
Trends in the Average Number of Carnegie Units in Physical Education, Health, and Sports Taken by High School Students

	1990	1987	1982
	% (S.E.)	% (S.E.)	% (S.E.)
All	2.0 (.06)	2.0 (.07)	1.9 (.02)
Male	2.2 (.06)	2.1 (.07)	2.1 (.03)
Female	1.9 (.06)	1.8 (.07)	1.8 (.03)
White	2.0 (.06)	1.9 (.08)	1.9 (.03)
Black	2.1 (.09)	2.0 (.11)	2.0 (.07)
Hispanic	2.3 (.08)	2.4 (.09)	2.1 (.09)
Asian	2.2 (.10)	2.6 (.16)	2.2 (.09)
Academic	2.0 (.06)	1.9 (.07)	1.9 (.04)
Vocational	1.9 (.09)	1.9 (.10)	1.8 (.04)
Both	2.0 (.05)	1.9 (.08)	2.0 (.11)
Neither	2.1 (.09)	2.1 (.07)	2.0 (.03)
Public	2.1 (.06)	2.1 (.07)	2.0 (.03)
Nonpublic	1.4 (.13)	1.1 (.11)	1.5 (.08)

Appendix Table 20
Teachers' Report on the Instructional Emphasis Placed on Specific Mathematics Skills and Abilities, Grade 8, 1990 and 1992

		Heavy Emphasis	Moderate Emphasis	Little or No Emphasis
	Assessment Years	Percent of Students		
Learning Mathematics Facts and Concepts				
Nation	1992 1990	74 (1.8) 55 (3.9)	23 (1.9) 38 (4.0)	3 (0.9) 7 (1.6)
High Ability	1992 1990	72 (3.4) 60 (4.7)	22 (3.2) 33 (4.5)	6 (1.3) 7 (2.5)
Average Ability	1992 1990	73 (3.4) 47 (5.8)	24 (3.9) 45 (5.6)	3 (1.0) 8 (3.0)
Low Ability	1992 1990	83 (2.8) 59 (6.1)	17 (2.8) 36 (6.7)	0 (0.4) 5 (3.0)
Mixed Ability	1992 1990	70 (5.8) 61 (7.5)	25 (4.8) 33 (7.8)	5 (2.3) 6 (3.3)
Learning Skills and Procedures Needed to Solve Problems				
Nation	1992 1990	79 (1.8) 67 (3.7)	19 (1.7) 29 (3.4)	2 (0.5) 4 (1.2)
High Ability	1992 1990	75 (4.2) 70 (5.7)	21 (3.8) 24 (5.1)	4 (1.5) 5 (2.2)
Average Ability	1992 1990	81 (2.2) 66 (6.0)	18 (2.0) 30 (5.5)	1 (0.7) 4 (1.9)
Low Ability	1992 1990	84 (2.3) 70 (4.9)	15 (2.3) 28 (5.2)	0 (0.4) 2 (1.7)
Mixed Ability	1992 1990	76 (4.0) 69 (7.1)	22 (3.6) 28 (7.1)	2 (1.2) 4 (2.8)
Developing Reasoning Ability to Solve Unique Problems				
Nation	1992 1990	49 (2.1) 46 (3.2)	46 (1.9) 39 (3.2)	5 (0.9) 16 (2.3)
High Ability	1992 1990	72 (3.7) 77 (3.8)	26 (3.7) 20 (3.5)	1 (0.6) 4 (1.4)
Average Ability	1992 1990	50 (3.8) 42 (4.2)	46 (3.9) 39 (3.6)	4 (0.8) 20 (4.0)
Low Ability	1992 1990	28 (4.5) 32 (6.1)	59 (5.0) 35 (6.3)	13 (2.0) 33 (5.9)
Mixed Ability	1992 1990	38 (4.4) 33 (6.7)	55 (4.1) 56 (8.1)	7 (2.6) 11 (4.5)
Learning How to Communicate Ideas in Mathematics Effectively				
Nation	1992 1990	40 (2.3) 38 (3.4)	50 (2.5) 42 (3.5)	10 (1.7) 20 (2.8)
High Ability	1992 1990	52 (3.3) 52 (5.3)	40 (3.3) 41 (5.5)	8 (2.7) 8 (2.7)
Average Ability	1992 1990	41 (4.1) 34 (5.0)	52 (4.3) 44 (3.8)	7 (2.1) 22 (4.3)
Low Ability	1992 1990	27 (4.6) 35 (6.1)	56 (4.5) 31 (5.1)	17 (4.9) 33 (5.9)
Mixed Ability	1992 1990	34 (4.4) 33 (7.1)	56 (4.8) 45 (8.8)	11 (2.3) 22 (6.2)

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Appendix Table 21
Teachers' Reports on Placing Heavy Instructional Emphasis on Developing Reasoning Ability to Solve Unique Problems, Grade 8, 1992

Public Schools	Percentage of Students	Public Schools	Percentage of Students
Nation	48 (2.2)	Minnesota	46 (3.4)
Northeast	56 (4.5)	Mississippi	56 (3.2)
Southeast	47 (3.9)	Missouri	42 (2.9)
Central	41 (4.8)	Nebraska	41 (4.1)
West	49 (4.1)	New Hampshire	47 (3.4)
States		New Jersey	63 (3.9)
Alabama	42 (3.5)	New Mexico	46 (3.1)
Arizona	51 (3.5)	New York	40 (3.1)
Arkansas	31 (2.6)	North Carolina	48 (3.3)
California	49 (3.1)	North Dakota	48 (4.0)
Colorado	51 (2.7)	Ohio	39 (3.7)
Connecticut	49 (3.3)	Oklahoma	39 (4.2)
Delaware	50 (0.9)	Pennsylvania	52 (3.9)
Dist. Columbia	71 (1.3)	Rhode Island	53 (1.0)
Florida	52 (3.1)	South Carolina	51 (3.3)
Georgia	54 (3.0)	Tennessee	45 (3.6)
Hawaii	35 (0.9)	Texas	61 (2.9)
Idaho	50 (2.8)	Utah	49 (2.0)
Indiana	45 (3.0)	Virginia	48 (2.1)
Iowa	47 (4.5)	West Virginia	47 (2.9)
Kentucky	53 (3.4)	Wisconsin	52 (4.6)
Louisiana	47 (4.0)	Wyoming	40 (2.7)
Maine	50 (4.0)	**Territories**	
Maryland	51 (2.8)	Guam	37 (1.2)
Massachusetts	48 (3.4)	Virgin Islands	58 (1.2)
Michigan	52 (4.3)		

Publications

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Policy Information Reports

Becoming Literate About Literacy, 1994, $7.50.

This summary report is based on the results of the National Adult Literacy Survey, carried out by the National Center for Education Statistics through a contract with Educational Testing Service. This brief volume provides highlights from that survey, including actual examples of what tasks adults can perform at each level of prose, document, and quantitative literacy. Results are also presented for demographic subgroups of adults.

Testing in America's Schools, 1994, $7.50.

This report provides a profile of statewide testing programs in 1992-93, as well as a view of classroom testing practices.

Training to Be Competitive: Developing the Skills and Knowledge of the Workforce, 1993, $6.50.

The report describes the extent of worker training in the U.S. and the literacy level of job seekers. Policy options available for increasing the training investment are also discussed.

America's Smallest School: The Family, 1992, $5.50, ED 349 320.

A national resolve to improve and recognize the family as an educational institution is critical to achieving the nation's education goals for the year 2000. This report pulls together many of the measures that reflect what goes on outside school and within the realm of the home in terms of educational achievement.

The State of Inequality, 1991, $4.50, ED 340 716.

Legal and legislative struggles over school finance inequalities may change the face of education in this decade as much as any current education reform initiative. This report details disparities in education funding nationally and within the states. It analyzes data that teachers supplied about the availability of instructional resources and student learning. The new wave of court rulings on school finance is also reviewed.

Performance at the Top: From Elementary Through Graduate School, 1991, $6.00, ED 333 052.

This report presents data on educational achievement that indicates how well the nation's top students are performing. The report scans student performance from the fourth grade through graduate school using indicators such as the National Assessment of Educational Progress, Advanced Placement (AP) participation, college and graduate school entrance tests, and higher education degrees.

The Education Reform Decade, 1990, $3.50, ED 326 549.

The 1980s was a period marked by profound changes in education policy. This report summarizes the changes in elementary and secondary schools and assesses the results. It reviews a number of topics, including student achievement levels, teacher standards, and student retention statistics. It assesses progress made in eliminating achievement gaps between minority and majority groups and between males and females.

From School to Work, 1990, $3.50. ED 320 947.

The U.S. is among the worst in the industrial world in helping students who don't go on to college make the transition from school to work. This report discusses student work during high school and differences between skills acquired in the classroom and those needed at the workplace. It also reviews the information processing skills of high school graduates, new efforts to integrate academic and vocational education, and the weaknesses of linkages between school and the workplace.

What Americans Study, 1989, $3.50, ED 312 271.

Increasing course requirements in key academic subjects was a central theme of educational reform in the decade of the 1980s. This report provides information on what was being studied and on how this changed over time for high school graduates and college-bound seniors. It also describes course-taking patterns for eleventh-, eighth-, and fourth-grade students.

Workbooks and Other Resources

Indicators of the School-to-Work Transition, A Policy Issue Perspective. April 1994, $2.50.

This paper explores the development of a set of indicators devoted exclusively to the school-to-work transition. Three sets of indicators are discussed — final outcomes, intermediate outcomes, and system outcomes.

The Influence of Minimum Competency Tests on Teaching and Learning, A Policy Issue Perspective, March 1994, $2.50.

This report uses data from the National Assessment of

Educational Progress (NAEP) to compare student achievement changes in states using high-stakes minimum competency tests, with changes in states not using them.

Education Issues of the 1990s, A Policy Information Summary, 1993, $8.25.

This resource provides excerpts, or whole articles, from a large portion of the Center's publications.

Performance Assessment Sampler, A Workbook, 1993, $11.25.

This "sampler" reproduces excerpts from a broad range of new performance assessment efforts and gives information on where to go for more information.

Linking Educational Assessments: Concepts, Issues, Methods, and Prospects, A Policy Issue Perspective, Robert L. Mislevy, 1992, $6.50.

Educators tracking progress towards national goals must decide how to evaluate the results of a variety of local, state, and national assessments. While the report cautions against relying on one test or believing that statistical methods can make all tests comparable, it discusses ways that various assessments can be linked so that performance can be reported in common terms.

National Standards for Education: What They Might Look Like, A Policy Information Workbook, 1992, $4.75, ED 356 240.

A congressionally mandated panel has called for high national standards for student achievement and a national assessment system to gauge their attainment. To help policymakers to envision such standards, this workbook provides examples from eight sets of existing standards that describe what students should be taught or what they should know or be able to do in various subjects.

Considerations for National Examinations, A Policy Issues Perspective, Albert E. Beaton, 1992, $2.50.

The test-based reform movement relies heavily on the assumption that a national testing system can be designed, administered, and interpreted in ways that would improve the educational process and student performance. This paper explores some of the basic issues in building and using high-stakes tests in educational reform and recommends some ways to proceed.

What Americans Should Know: Information Needs for Setting Education Goals, A Policy Information Proposal, 1991, $3.50, ED 356 239.

The National Education Goals Panel has created an extensive system to track progress toward the national education goals. To attain these very general goals, however, the educational community must translate them into specific targets. This proposal suggests the kinds of information that could be developed to help in this process.

Skills Employers Need: Time to Measure Them? A Policy Information Proposal, 1990, $3.50, ED 356 237.

This brief paper summarizes the skills that employers seek in their job candidates. It proposes the development of an Employment Readiness Profile to measure progress in producing a quality labor force.

Choice in Montclair, New Jersey, A Policy Information Paper, 1990, $5.00, ED 314 493.

The paper reviews a variety of public school choice programs, describes and evaluates the Montclair model, and outlines some factors contributing to the district's success.

State Education Indicators: Measured Strides, Missing Steps, 1989, $3.75, ED 311 573.

The monograph describes the central features of indicator systems and the issues that must be addressed concerning their purposes, applications, and effects at the state and local levels. It also provides case studies of state education indicator systems in California, Connecticut, New York, and South Carolina.

Earning and Learning, 1989, $3.50.

This report explores the relationship between work and student achievement, using information from the 1986 National Assessment of Educational Progress (NAEP).

Information for National Performance Goals for Education: A Workbook, 1989, $3.50, ED 356 236.

This workbook was prepared to assist those charged with setting national education performance goals as a result of the Education Summit held by President Bush and the nation's governors in Charlottesville, Virginia.

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